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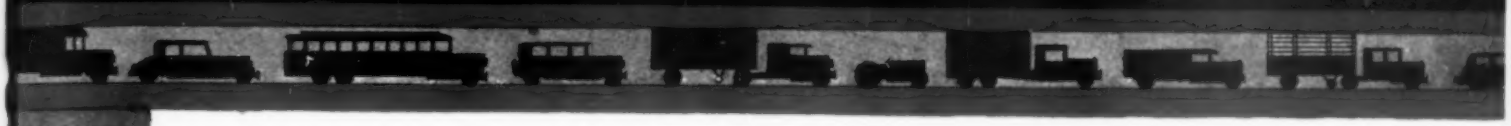
FLEET OWNER

THE FERGUSON PUBLISHING CO., 90 WEST ST., NEW YORK, N.Y.

Devoted to the Better Operation and Maintenance of Truck, Bus, Taxicab, Passenger Car and All Automotive Fleets



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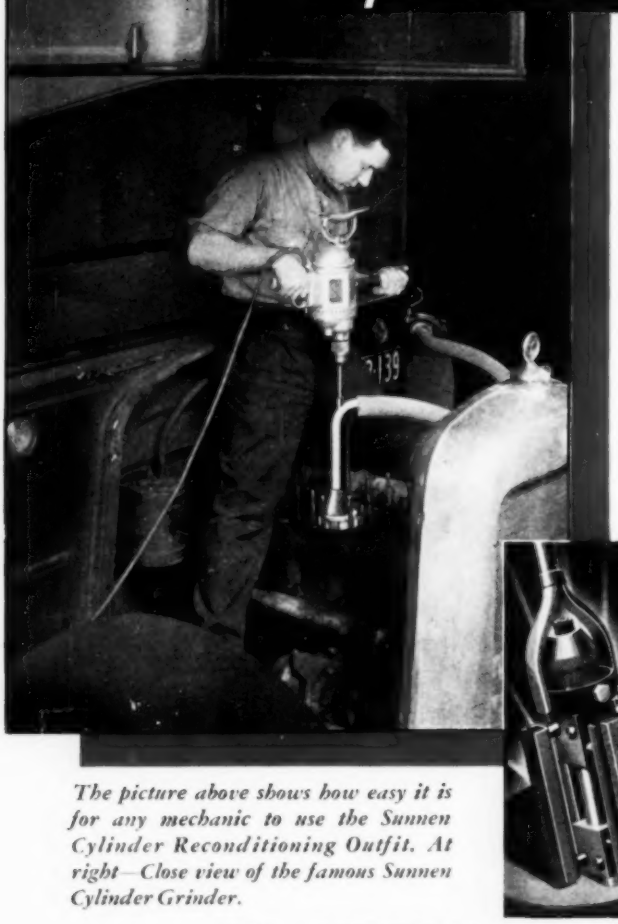

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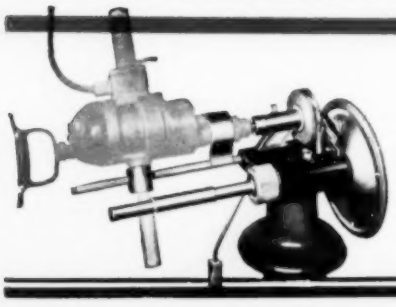

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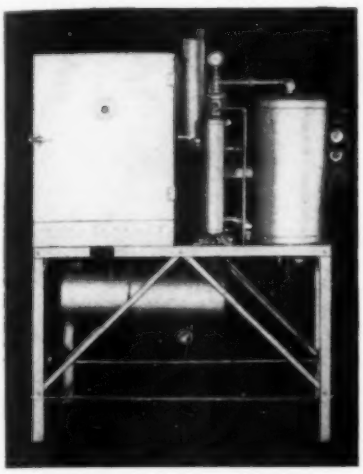

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We pay ..... per gallon of oil.
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Signed ..... Position 4-32

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The

FLEET OWNER

Published Monthly in the interests of Automotive Fleet Owners who maintain their own Repair and Service Shops and devoted to the better Operation and Maintenance of Truck, Trailer, Bus, Passenger Car, Taxicab and all Automotive Fleets.

Vol. 8 **New York, April, 1932** **No. 4**

Table of Contents

It's Here!—The Cost "Yardstick"	**Clinton Brettell**	8
Our Experience With Diesels	**Martin Schreiber**	12
Is "Brakes O. K." Sufficient?	**F. W. Parks**	16
Deluxe Tractor for Caldwell's Fleet		20
Solving Truck Tire Problems	**Wilson C. Bray**	24
Question-of-the-Month		26-31
Applying Standardized Rims	**Wes. D. Smith**	32
A Few Battery Charging Hints	**H. L. Floyd**	34
More About Crankcase Sludge	**Robt. P. F. Liddell**	36
G. E. Has Travelling Advertisement		37
How to Service the Startix		38
Reader Say-So		40
Trouble Shooters' Department		41
What Do You Read?		43
Bulletins of the Month		44
Ford Passenger Cars Announced		45
White Handles New Indiana Trucks		46
Studebaker Reduces Prices on 1½-Tonner		46
Diamond T Has New 1½-Ton Six		47
Three Truck Groups in New Willys Line		47
Lycoming's 8-in-Line Truck Engine		48
Hauling 'Em Alive With a Trailer		48
Two New Sixes in Dodge Truck Line		49
New Fast Eight by Pierce-Arrow		49
International's New 5-Tonners		50
Device Makes Carburetor Adjustment Easy		50
New Products, Tools, Shop Equipment		51
Index to Advertisers		54

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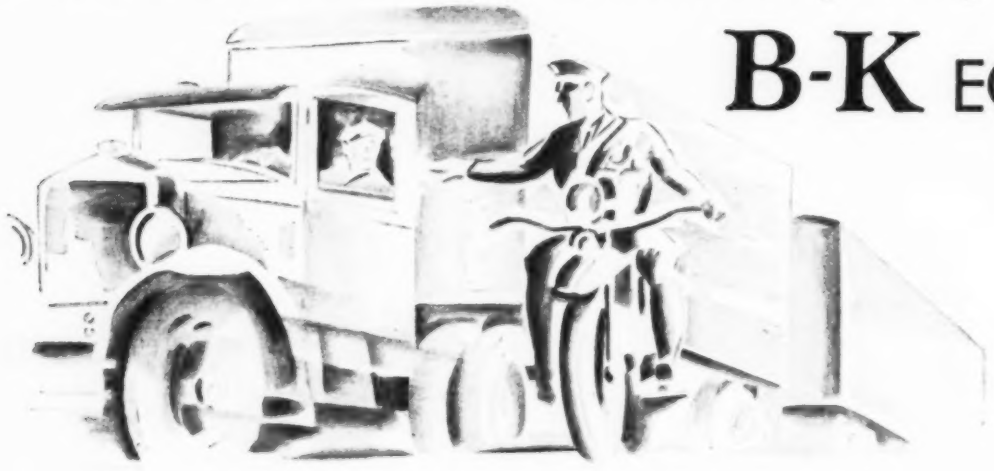

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VOL. 8
NO. 4

The FLEET OWNER

APRIL
1932

It is with deep sorrow that we announce the sudden death, on March 13th, of our beloved President, Arthur D. Ferguson.

In the flesh, our leader is gone, but his spirit still lives and remains with us to guide and direct the destinies of our organization; to help us carry out the sound, sensible and universally accepted publishing ideals, which he established twenty-three years ago.

With his many friends and acquaintances in the Automotive Industry our sorrow is shared. May Heaven give us the strength to carry on incessantly, consoled with the thought that our invisible, ever-present leader is serenely watching, somewhere, comfortably observing his fondest ideals being carried out.

The Staff

By Clinton Brettell,
Garage Superintendent, R. H. Macy & Co., New York.

It's Here!—The Cost "Yardstick"

Now You Can Compare Your Vehicle Costs With Those of the "Other Fellow" and Get Results That Really Mean Something—This System is Based on Daily Vehicle Mileage

FROM time to time, the various trade papers carry articles containing very complete cost figures on various fleet operations.

These, and all other similar figures are not in themselves an end, but rather a means to an end—namely, the comparison of individual car or fleet operations, in order to decide as to the relative efficiency or economy of each, the control of operations, etc.

This is a fact that is often lost sight of in the maze of detail involved. Or—if it is recognized—and an attempt is made to use the figures for the purpose intended, apparently unsurmountable obstacles are immediately encountered in the nature of operating "variables" that make the figures—as they stand—entirely *valueless* as a basis of comparison or control.

I use the term "apparently unsurmountable" advisedly in describing these obstacles, as an intensive study of the subject over a number of years and among several fleets, has quite conclusively proven to the satisfaction of the writer that by proper analysis and co-relation these *variables can be eliminated.*

In the following paragraphs the method pursued and results attained will be outlined. While the study is by no means a finished job, it is believed that a way to the solution of this problem is clearly indicated—and one which, being generally applicable to any operation, will provide a ready and authentic "yard stick" for use in comparisons of performance on a "cost record" basis.

I think it is safe to say that the majority of the readers of this article have undoubtedly noticed the wide variation in gas-mileage as between vehicles on long-run, few-stop service, as compared with identical vehicles in short-run, multi-stop, traffic-congested operation. The same condition also presents itself in regard to tire mileage, brake mileage, etc.—in these 2 classes of service. Repairs and general maintenance show very much the same trend. The first type of operation would, of necessity, produce a comparatively high daily mileage whereas the latter would yield just the reverse.

What more logical, then, than to *relate cost per mile, to average daily mileage!*

This was tried, *and it actually worked,* and it was found that costs could be accurately transposed from one daily mileage basis to another, in order to place them on a fair level for comparison with other costs of equal mileage.

The method employed was quite simple. A series of "work sheets" was laid out as shown in figures 1, 2, and 3 (The term—season—is a 6 months period). (Similar Tables could be made for each make of car in the fleet).

On these sheets were entered, under the "average daily mileage" column for each vehicle, its 6 months' *cumulative* operating cost per mile (gas, oil, tires, repairs to body, chassis, paint), for each, grouped by the period in question (1st Season, 2nd Season, etc.).

These results were then plotted on a series of charts with horizontal co-ordinates representing average daily mileage, and vertical co-ordinates representing operating cost per mile. These charts are shown in figures 4, 5, and 6. (Note—one of these charts for each make car in tne fleet).

From these charts, it was quite clearly shown that the following general trends are traceable in *all* cost figures:

(1) *The cost per mile varies inversely with some function of the average daily mileage. That is, the higher the daily mileage, the lower the cost per mile.*
(2) *That this phenomenon is more pronounced at lower mileages, than at the higher ones.*
(3) *That the rate of change is more uniform with heavy cars, than with light cars.*
(4) *That there is a general tendency for an increased cost per mile—from one season to the next, but not uniformly—nor at any fixed rate.*
(5) *That this condition is more pronounced in the early life of the car.*

The next step was to bring these factors together into a usable form.

This was done—as far as variation of cost with mileage was concerned, by selecting a typical, average curve from each make of car of a given type, picking off costs at identical mileages and entering

Figure 1

Light Capacity Route Car

Season	25 Av.	30 Av.	35 Av.	40 Av.	45 Av.	50 Av.	55 Av.	60 Av.	65 Av.	70 Av.	75 Av.	80 Av.	85 Av.	90 Av.	95 Av.	100 Av.
1	.044	.037	.051	.039	.042	.030	.033				.034		.032	.030		.030 (120)
2		.040	.051	.044	.046	.032	.033	.036	.031	.031			.033		.032	
3		.041	.044	.050	.047	.038	.030	.034	.038	.033	.031	.036		.033		

Figure 2
Medium Capacity Route Car

Season	30 Av.	35 Av.	40 Av.	45 Av.	50 Av.	55 Av.	60 Av.	65 Av.	70 Av.	75 Av.	80 Av.	85 Av.	90 Av.	95 Av.	100 Av.	Over
1	.051	.050	.048	.041	.051	.036	.042			.044	.034	.036		.033		.032
2	.045	.042		.040	.046	.035	.039	.044	.035	.034	.031	.035			.028	.032
3		.042		.040	.048	.034	.035	.042	.034	.034	.037	.030	.031			
4								.042						.039		
5								.043								

Figure 3
Heavy Capacity Route Car

Season	45 Av.	50 Av.	55 Av.	60 Av.	65 Av.	70 Av.	75 Av.	80 Av.	85 Av.	90 Av.	95 Av.	100 Av.	105 Av.
1	.054			.058	.054	.050	.059		.060	.057			
2			.059	.063	.059	.060	.055	.053	.054	.055	.056	.053	
3		.063	.071	.083	.061	.061	.061	.074	.062	.059	.063	.054	.061
4		.063		.083	.069	.068		.065		.062		.051	.059
5			.061	.072	.065	.063	.069		.065	.059	.063		.052
6			.074	.062	.065	.071		.071	.067		.059		

these on a work sheet under those mileages, and averaging costs of all the makes under each mileage heading.

From this table, taking the cost at the *lowest* mileage as "base," the percent of decrease in cost for each higher mileage could be figured.

By plotting these figures on another chart, against daily mileage, a set of curves such as shown in Fig. 7 are obtained for the various types of vehicles in the fleet.

The next step was to develop a formula for transposing the cost at one daily mileage to that at a different mileage.

This was quite simply accomplished in the following manner, which can be most readily followed by referring to the "Cost Variation Chart"——Fig. 7.

In working the following formulae, it will be well to note the meanings of the following symbols. Let

C_B = Cost at Base Mileage (Lowest).
C_L = Cost at Low Daily Mileage
C_H = Cost at High Daily Mileage
P_L = Percent Decrease in Cost at Low Daily Mileage
P_H = Percent Decrease in Cost at High Daily Mileage

The percent decrease in cost at low daily mileage (P_L) in comparison with the cost at the base mileage, is determined thus:

$$\frac{C_B - C_L}{C_B} = P_L$$ (Percent decrease in cost at low daily mileage).

The percent decrease in cost at the high daily mileage (P_H) in comparison with the cost at the base mileage, is determined thus:

$$\frac{C_B - C_H}{C_B} = P_H$$ (Percent decrease in cost at high daily mileage).

Solving for C_B in both equations, we have, in order to determine the relation between the base and the low and higher mileage costs, the following:

$$C_B = \frac{C_L}{1 - P_L} \quad \text{and} \quad C_B = \frac{C_H}{1 - P_H}$$

Therefore,

$$\frac{C_L}{1 - P_L} = \frac{C_H}{1 - P_H} \quad \text{or} \quad C_H = C_L \times \frac{1 - P_H}{1 - P_L}$$

In applying the accompanying tables and charts to the following typical example, this formula is used, the previous figures only serving to lead up to it:

$$CH = CL \times \frac{1 - PH}{1 - PL}$$

For example—

If C_L = $.045 per mile (at 75 miles per day)
P_H = 25% = .25 (at 105 miles per day)
P_L = 15% = .15 (at 75 miles per day)

Then—

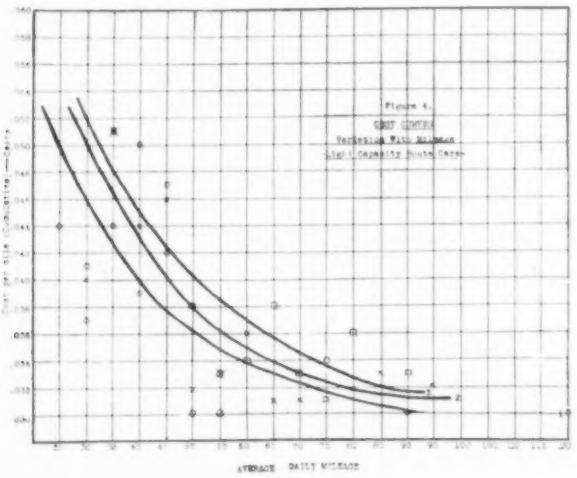
$$C_H = .045 \times \frac{1 - .25}{1 - .15} = .045 \times \frac{.75}{.85} = \$.0398 \text{ per mile}$$

Or, specifically, a certain large type car, showing an average cost of 4.5 cents per mile at 75 miles per day, would show a cost of 3.98 cents per mile at 105 miles per day.

Similar calculations, employing the curve for the particular class of vehicle under consideration, will yield figures that are on a proper basis for comparison and scrutiny.

Next comes the study of the "age factor." This

HOW TO COMPARE OPERATING COSTS (*Continued*)



is a little more erratic in its behavior, particularly if intervals of insufficient length are selected for the study. That is readily understood when one realizes that the money put into "reconditioning" if wisely spent—yields a subsequent "low maintenance cost" period of possibly 6 months to a year, which will show a low cost as compared with the previous period during which the money was expended for the "reconditioning."

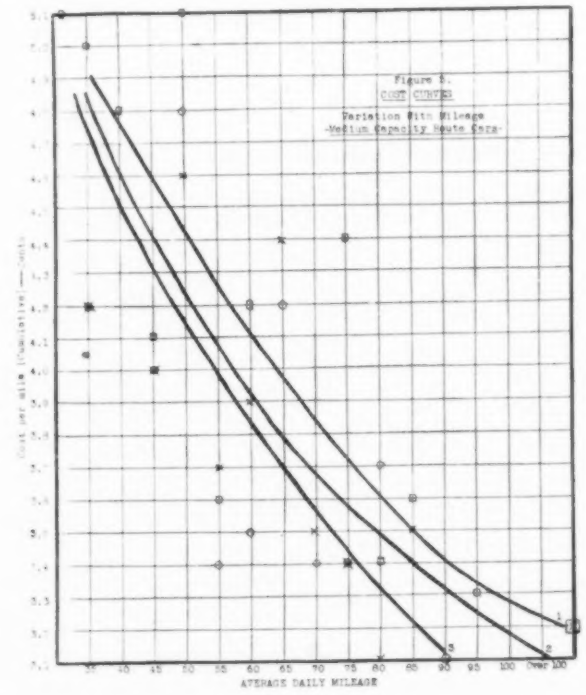
However, while there will be "hills and valleys" in the cumulative cost curve, due to this and other conditions, the normal trend will be upward, at a decreasing rate as cars get older, principally for the reason that the effect of any one period on the "cumulative" cost, becomes less and less, as the number of periods grows with age of the car.

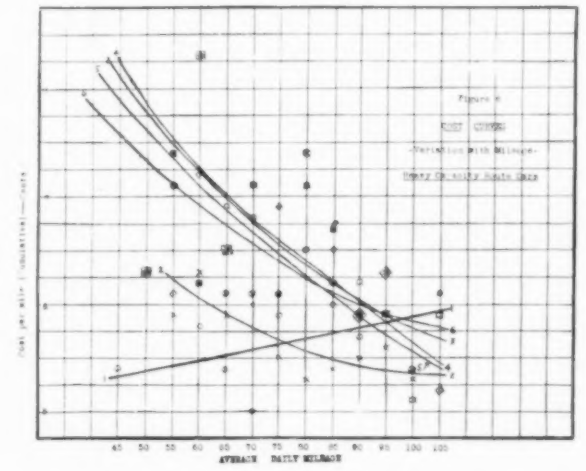
By taking from charts for each type and make car, the average cost increase (at a given mileage) with age, over a considerable number of years, the average increase per period (season) was arrived at for each make and type. By again grouping the makes by type and striking average, the cost increase (average) per season, for each of the several different types was arrived at.

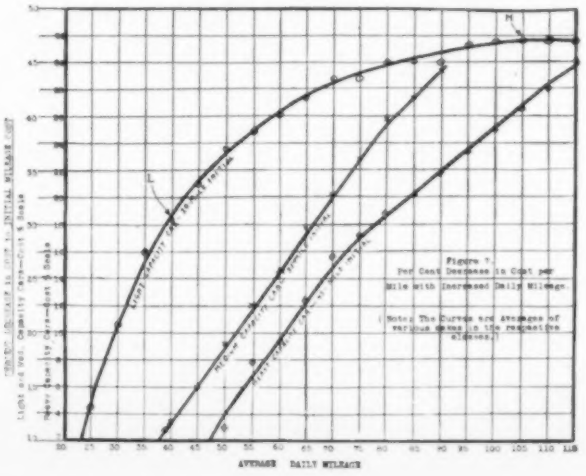
Light Type—		
Low Priced	7.03%	Increased Cost
High Priced	3.28%	per Season
Average of Price Classes	5.15%	
Heavy Type—		
Low Priced——(Pneum. Tire	11.50	Increased Cost per Season
High Priced—(Solid Tire)	4.18	
Med. Priced—(Pneum. Tire)	3.49	
Average of all Price Classes	6.39%	

The statement made in the earlier portion of this article, indicating that this study is really only a preliminary investigation, is reiterated, and there may, and probably are, some errors in the premises accepted and conclusions drawn. The writer would personally welcome "constructive criticism" of the subject matter of this article and more particularly an "open meeting" discussion at some future technical automotive transportation conference.

(*Editor's Note*: In preparing this article, Mr. Brettell wishes to have it generally understood that the data submitted are not necessarily actual figures applying to the Macy Department Store fleet, but on the other hand are as a result of observations gained in his intensive study of this particular subject over a number of years, and among several fleets.)







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Delco-Remy ignition engineers have designed this new HEAVY DUTY COIL to meet the severe requirements of motor coach, truck and marine service. An entirely new development in ignition coils, it has *ample capacity in reserve* to withstand heaviest operating conditions. The extra area of its distinctive fin-wall case insures adequate cooling. It is moisture proof. Its cap is made of a new, high-dielectric and arc-resisting material and is fitted with the Delco-Remy screw-type high tension terminal. In every detail, it is a rugged, dependable ignition coil especially designed for heavy duty service.

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USE GENUINE DELCO-REMY PARTS

Say "I saw it in FLEET OWNER"—It Helps!

Our Experience *with* Diesels

By Martin Schrieber

General Manager in Charge of Plant, Public Service Coordinated Transport, Newark, N. J.

THE motor coach as we have it today has advanced very much in the last decade. There is still plenty to be done along fundamental lines. The gasoline engine is expensive in fuel consumption and has its headaches from ignition and carburetion difficulties. It is for this reason that many engineers are experimenting with a heavier and cheaper oil as a fuel.

At first it was thought that by the application of a special manifold and preheating crude oil, it could be adopted for use in any gasoline engine. However, up to the present such devices have not fully proven themselves, so in the last few years Diesel engines have attracted a great deal of attention in connection with their possibilities in the transportation field.

Close-up of the engine of the coach shown above. This is the Public Service Diesel-Electric job mentioned in this article.

On May 21, 1930, the Public Service Coordinated Transport, sent the first Diesel-electric bus operated in this country from Newark, N. J., over the Alleghany Mountains, to the Silver Jubilee Convention of the Society of Automotive Engineers at French Lick Springs, Indiana. The distance was 900 miles and the bus averaged 7.4 miles per gallon of fuel oil. An interesting sidelight of the trip was that the fuel supply was low about the time the bus arrived at a small oil refinery near Warren, Pa. Here there happened to be stored a quantity of a very low grade, partly refined fuel oil. This oil was so thin it was thought best to add some lubricating oil. This was promiscuously done and with the crude concoction the trip was satisfactorily completed.

About a year later, an airplane, motored with a Packard Diesel engine, established a new world's duration record for non-refueling endurance. The plane remained aloft for 84 hours and 32 minutes.

At the Indianapolis Motor Speedway, May 30, 1931, a Cummins Diesel powered racing car completed the 500-mile grind without a single stop. This was the first-time in the history of this famous classic this feat was ever accomplished.

An Indiana Truck Corporation truck, equipped with a Cummins Diesel engine, on August 15, 1931, broke all truck records for speed and economy for the 3,000 mile transcontinental run from New York City to Los Angeles. This truck, weighing 8 tons, made the trip in 97 hours and 20 minutes, or at the rate of 33 miles per hour, making 15¾ miles per gallon of fuel oil.

The above illustrations are helpful to show the large field and the wide adaptability of the crude oil engine. There is no reason to believe there is any lack of opportunity to economically make use of Diesel engines in an extensive way for street transportation. This is true due to the fact of the importance of the cost of fuel. Even if the gasoline and crude oil is the same price, which is not likely, there is still an advantage, due to the quantity of fuel consumed in the Diesel engine, as well as other considerations in connection with its operation. Indeed, there are now practical demonstrations of Diesel motored buses in every day service, both in this country and in Europe.

Europe up to this time has been the leader in Diesel engine work, because they were under the urge of a large differential between the cost of gasolin and fuel oil. The Diesel engine was invented in Germany and the first engine was publicly exhibited in the Munich Exhibition in 1898. However, its development was backed by influential interests like the Krupps and M. A. N. Companies, and made rapid advancement, spreading all over Europe. Up to date there are substantially 3,500 Diesel buses and trucks actually in operation in Austria, England, France, Germany and Switzerland.

The London General Omnibus Company, Ltd., operates 12 Diesel motored double deck buses in regular service on its property. Each of these buses are equipped with 6-cylinder Diesel engines built by the Associated Equipment Company. The buses have operated 264,000 miles. The engines use 36 per cent less fuel than comparable gasoline engines. It is contemplated to add 50 more of the units to the companys fleet this year. A Crossley 6-cylinder Diesel-engined double deck bus is

(Please turn to page following)

Fleet Executive Gives His Company's Diesel Engine Experience and His Views on the Future of Diesel Engines in Transportation

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Larrabee-Deyo Corporation

WHERE PERFORMANCE TAKES PREFERENCE OVER PRICE

FAST deliveries . . . clicking off thousands of miles of hard service . . . prove SKF Self-Aligning Ball Bearings ideal for propeller shaft locations on trucks and buses. Daily operation under high speeds to cover long distance routes has no effect on the long-life and smooth operating characteristics of the two SKF's on the propeller shaft of the Larrabee-Deyo 3½ ton truck shown above.

SKF Self-Aligning Ball Bearings insure the utmost dependability with very infrequent attention. The value of the inherent self-aligning feature cannot be over estimated. With wear a negligible factor and adjustments eliminated, SKF's consistently bring home the fact that they are the lowest in cost per mile of operation. Reason enough why SKF Performance Takes Preference Over Price.

You may buy a bearing as a bargain but try and get a bargain out of using it, for nothing is apt to cost so much as a bearing that cost so little.

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SKF

Ball and Roller Bearings

Say "I saw it in FLEET OWNER"—It Helps!

DIESEL ENGINES *in* TRANSPORTATION (*Continued*)

A Diesel-engined, heavy-duty six-wheeler.

also in regular operation in Manchester, England, and 4 more buses of the same design are on order. The Diesel engine bus maintains with ease its place with the gasoline buses, and no difficulties in handling have been experienced. There are now about 525 large-sized Diesel-engined vehicles in operation in England alone.

Capitol District Traction Company, at Albany, N. Y., has operated a Mack bus equipped with a 6-cylinder Mercedes-Benz Diesel engine and General Electric propulsion units for a period of about a year. This bus fills in on one of their lines as a regular unit with gasoline buses and has run well over 24,000 miles. The fuel mileage is 5.22 miles per gallon as compared to a gasoline-electric unit that has a fuel mileage of 2.78 miles per gallon, or a saving of 46 per cent in quantity of fuel.

The Diesel engine experience of Public Service Coordinated Transport, at Newark, N. J., covers a period of approximately two years. One bus is in regular operation. It fits in with a schedule with gasoline buses on one of its city lines. This bus is a Yellow Coach Z-240, equipped with a Mercedes-Benz Diesel 6-cylinder engine in conjunction with generators and motors of the General Electric Company. The experience in Newark compares favorably to that of other places where Diesels are operated. The records show that the fuel mileage is about 5.50 miles per gallon, as against 3 miles for the gas-electric buses.

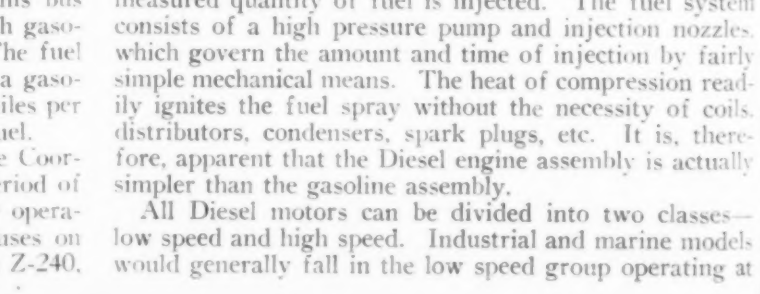
There is no doubt that Diesel engines would soon be available in a large way if bus operators would be bold enough to insist on trying them out on a complete line. As long as operators are interested only in single units, the manufacturer is bound to put off the day of making the necessary changes in plant and tools for the new job. The sample jobs have caused a great deal of interest and wonderful improvements to the engine. The first engines were low r.p.m., and unnecessarily large, noisy at slow speeds and at idling.

The later type Diesel engines are so advanced that the layman has difficulty of distinguishing them from the gasoline engines, at least as far as performance and appearance are concerned. As long as experimental jobs are only used in regular street transportation service, they will always lag behind the gasoline engine, and this will be an excuse for not putting them out on a production basis. Motor bus transportation has suffered in the past due to competition with private cars. The design of buses has always trailed the design of the touring cars. Now there is an opportunity to lead instead of follow.

There is no intention to enter into a highly technical dissertation, but as previously mentioned, the gasoline engine is a terrible fuel consumer and still prone to ignition and carburetion trouble. The greater portion of the heat units available in the fuel consumed by a gasoline engine are lost in the exhaust and cooling water; engineering tests show that approximately only one-quarter are converted into useful power. Years of research work have been carried on and many experimental models built in an endeavor to increase the thermal efficiency of gasoline engines. These attempts have resulted, however, in moderate improvement only. On the other hand, scientific tests and practical experience demonstrate the fuel efficiency of the Diesel engine to be 30 to 50 per cent greater than that of the gasoline engine. This superior fuel economy of the Diesel engine, together with the fact that the entire ignition system is eliminated, makes it particularly attractive to fleet operators.

Although some look upon a Diesel engine with a feeling of awe and mystery, the engine and accessories are quite simple. The automotive Diesel draws into each cylinder a full charge of unheated air; there being no throttling of air or complicated manifold and heating systems to insure correct carburetion as in the gasoline engine; the pure air is then compressed, after which a measured quantity of fuel is injected. The fuel system consists of a high pressure pump and injection nozzles, which govern the amount and time of injection by fairly simple mechanical means. The heat of compression readily ignites the fuel spray without the necessity of coils, distributors, condensers, spark plugs, etc. It is, therefore, apparent that the Diesel engine assembly is actually simpler than the gasoline assembly.

All Diesel motors can be divided into two classes—low speed and high speed. Industrial and marine models would generally fall in the low speed group operating at not over a few hundred revolutions per minute; the airplane, truck and bus models, running at well over a thousand revolutions per minute, would be considered high speed types. It is the latter in which we are particularly interested and this group may be in turn divided into two classifications: direct and indirect injection.



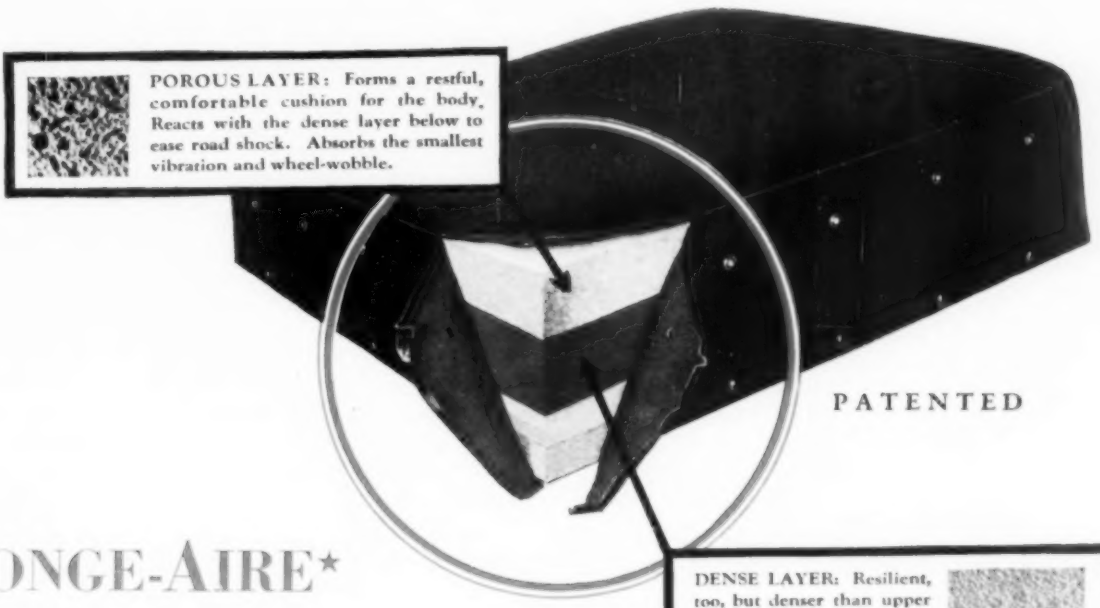
Stock-model Diesel bus, made in Germany and introduced in this country a few years ago. It has a six-cylinder engine.

In the first class, fuel is injected directly into the cylinder, whereas in the second class the fuel is first injected into a pre-combustion chamber, where part of it burns, and the resulting increased pressure forces the

(*Please turn to page 22*)

Cut Maintenance Costs

with this NEW IDEA *in truck seats*


POROUS LAYER: Forms a restful, comfortable cushion for the body. Reacts with the dense layer below to ease road shock. Absorbs the smallest vibration and wheel-wobble.
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DENSE LAYER: Resilient, too, but denser than upper layer. Absorbs heavier road shock. Prevents that "Jack in-the-box" catapulting motion, as well as side-sway. Gives the driver a sense of security and firmness in driving.

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Lasts Ten to Twelve Times Longer Than Ordinary Coil Cushions

The last word in truck seat economy . . . safety . . . driver efficiency. *A new idea throughout.* Sponge-Aire is the one seat fleet operators have been looking for, for years.

Sponge-Aire is built to wear . . . and take all kinds of punishment. Observe *(above)* how durably it is built. Two tough layers of long-wearing sponge rubber held tightly together with special cement. Protected by strong, comfortable fabric covering. *Made to last ten to twelve times longer than ordinary coil cushions.*

Sponge-Aire has no springs to break and tear clothing. No filling to lump or mat or get out of shape. *Sponge-Aire is a sure short-cut to minimum seat replacements and maximum driving efficiency. Send coupon.*

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* SAFE You want the driver comfortable—*but not to the extent that he becomes drousy.* Sponge-Aire gives the maximum degree of comfort consistent with driving efficiency.

* HEALTHY No "driver's back" with Sponge-Aire. It protects the back and kidneys, and *keeps the driver on the job, every working hour.*

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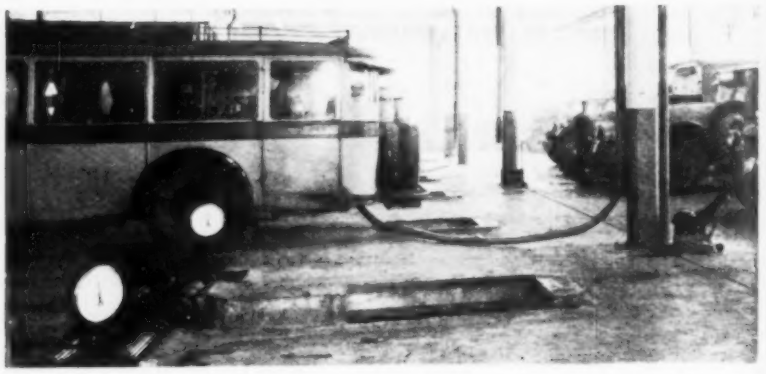
Is "Brakes O. K." Sufficient?

By F. W. Parks

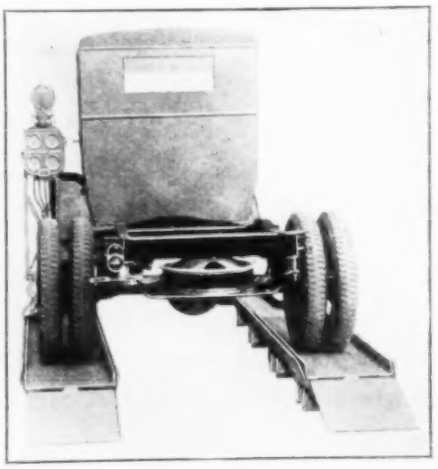


THE use of the expression, "Brakes O.K.", indicates that the automotive industry, fleet operators and the public have not accepted through common usage a unit for describing brake performance.

Each era of motor vehicle development has been marked by a certain amount of disagreement until experience settled the questions involved. When the "stopping" era began, do you recall the discussions over desirability of four-wheel brakes? But four-wheel brakes have finally won on their merit and now not a single make of motor vehicle is regularly equipped otherwise.

That question is definitely settled, but there still remains unsettled the manner by which brake performance shall be described.

The expression, "Brakes O.K.", is obviously inexact and meaningless. We do not speak of air pressure in tires as being O.K.—we describe it in pounds pressure per square inch. We do not mention cooling water temperature as being O.K.—we speak of it in degrees Fahrenheit. Nor do we mention speed as being O.K.—we describe it in miles per hour.



One of the newest brake testers which has recently been placed on the market. Note the provision for dual rear wheels.

These various examples indicate that we have adopted for common usage certain units for measuring. These units mean the same wherever the English system of weights and measures is used.

So now let us discuss the brake performance unit and see if we cannot all agree regarding it. It is fundamental that this unit be clear and understandable to fleet owners, mechanics, police officials, juries, lawyers, etc.

Engineers might ask, "Why not use the term 'deceleration' which we have used for years?" That's just the point. Engineers have used such a term for years, and yet outside the engineering profession it has not been generally adopted because it is too involved. It means the rate of change in velocity per unit of time. This is rather hazy to the layman.

Hence the question arises as to what term could be used that would be clear and understandable to everybody. "Feet to Stop from a Given Speed" is one that has made much progress toward adoption. It seems simple enough. If we adopt a uniform speed of the vehicle and a uniform type of road, then the number of feet in which the car can stop after brake application accurately describes the stopping performance of the vehicle.

The Bureau of Standards long ago suggested a speed of 20 miles per hour as the uniform speed at which to make such tests. Hence we might all adopt that uniform 20-mile-an-hour speed as the first requirement.

The second requirement is general acceptance of a specific type of road surface as standard—naturally that modern road surface having the most miles built and building. Concrete, of course! And anyone would naturally add the requirement that this road be clean, smooth, dry and level.

Therefore we have it: "From a speed of 20 miles an hour on clean, smooth, dry, level concrete road." If we measure the feet required to stop we have something understandable to everybody. If your car stops in 18 feet and mine in 25, anyone would know your brakes are in better condition than mine.

The next question is the means for measuring this stopping distance. The old "white lines across the road" method has been pretty generally discredited due to the possibility of error as high as 50 per cent.

The Manner by Which Brake Performance Shall Be Described Still Remains Unsettled — Grading Tables Seen as a Forward Step

NEW LOW PRICES!

1½ TON CHASSIS

$670

AT THE FACTORY

STUDEBAKER'S 1½-ton truck—130-inch wheelbase—famous for its 75-horsepower engine and rugged strength, is now offered at an even lower price—$670. It is the most powerful truck ever priced so low.

There is also a new 1½-ton chassis—141-inch wheelbase—designed specially for panel, stake and platform bodies. At $695 it is the biggest truck value in its field.

Marked economy of operation and dependability is obtained in Studebaker trucks because of the well designed, finely balanced 6-cylinder engines, husky axles and sturdy construction throughout. The Studebaker 6-cylinder engine develops a full flow of power at low engine speeds:

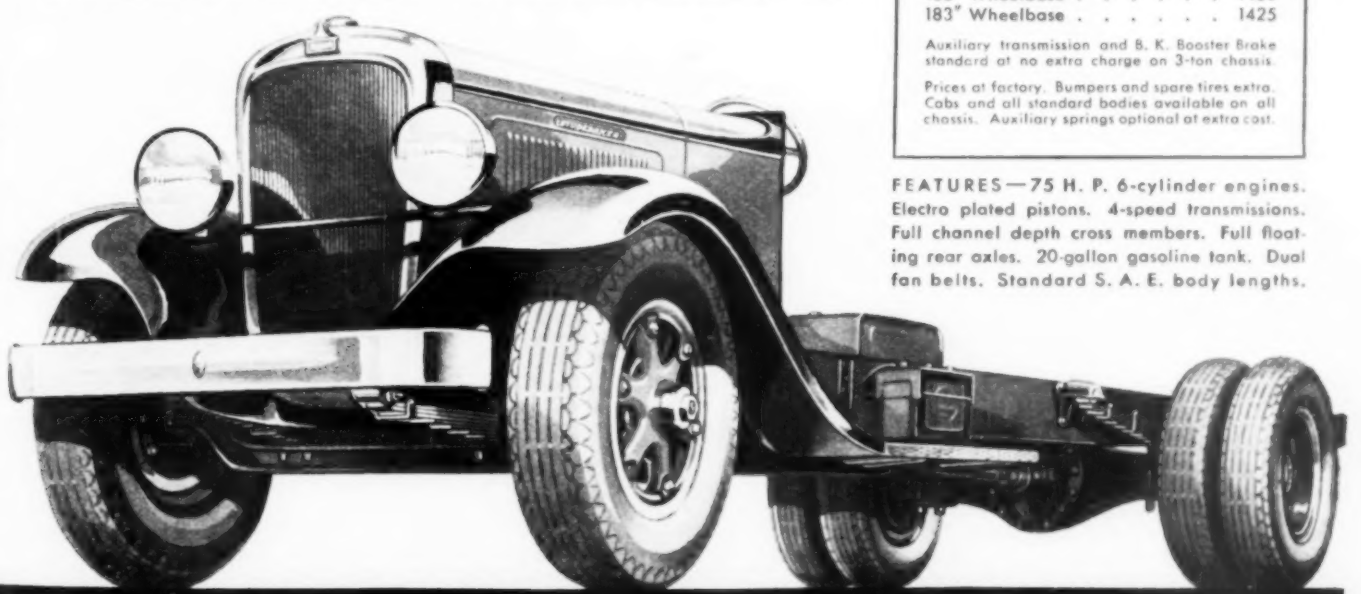
35 H. P. at 1200 R. P. M.
50 H. P. at 1760 R. P. M.
60 H. P. at 2180 R. P. M.
75 H. P. at 3200 R. P. M.

Studebaker's gain of 127% in registrations last year when the industry lost 23% was due to outstanding VALUE.

1½-TON CHASSIS	
130" Wheelbase	$670
141" Wheelbase	695
165" Wheelbase	745
Dual rear wheels at small extra charge	
2-TON CHASSIS	
141" Wheelbase	$895
153" Wheelbase	920
165" Wheelbase	945
3-TON CHASSIS	
141" Wheelbase	$1350
153" Wheelbase	1375
165" Wheelbase	1400
183" Wheelbase	1425

Auxiliary transmission and B. K. Booster Brake standard at no extra charge on 3-ton chassis.

Prices at factory. Bumpers and spare tires extra. Cabs and all standard bodies available on all chassis. Auxiliary springs optional at extra cost.



FEATURES—75 H. P. 6-cylinder engines. Electro plated pistons. 4-speed transmissions. Full channel depth cross members. Full floating rear axles. 20-gallon gasoline tank. Dual fan belts. Standard S. A. E. body lengths.

STUDEBAKER *Trucks*

Say "I saw it in FLEET OWNER"—It Helps!

GOOD STOPPING DISTANCES DEFINED *(Continued)*

TABLE I—MOTOR VEHICLE BRAKE PERFORMANCE

FOUR WHEEL BRAKE CARS

Stopping Distance	Comment	Grade
Between 15 and 16 feet	Perfect	A-4
" 16 " 18 "	Excellent	B-4
" 18 " 20 "	Good	C-4
" 20 " 25 "	Fair	D-4
" 25 " 30 "	Poor	E-4
Over 30 feet - - - - -	It's no longer a four wheel brake car	F-4

TWO WHEEL BRAKE CARS

Between 30 and 32 feet	Perfect	A-2
" 32 " 35 "	Excellent	B-2
" 35 " 40 "	Good	C-2
" 40 " 45 "	Fair	D-2
" 45 " 50 "	Poor	E-2
Over 50 feet - - - - -	Vehicle unsafe on highways	F-2

Note:—Stopping distances given are the feet required to stop on standard concrete road.

There remain two other test methods: First, instrument road testing, using a decelerometer; second, determination of stopping performance by brake testing machine readings without road test.

The decelerometer will undoubtedly enjoy an increasing use by law enforcement officials because it measures the stopping performance of the car. In small communities where volume of brake work does not justify adding brake testing machine equipment, necessity for certifying the ability of the car to stop will also undoubtedly create a larger market for instruments of this character.

But in order to obtain satisfactory brake performance on the road it is necessary for the mechanic to measure and adjust the brake performance of each wheel, since it is the sum of these performances which determines actual road performance. But if the mechanic can determine from these machine readings at each wheel just what the stopping ability of the car will be under road test, then obviously road testing becomes unnecessary and an expensive, wasteful, hazardous part of the job has been thereby eliminated.

We have seen in the previous discussion that a convenient road surface to use as standard is clean, smooth, dry, level concrete. It has an average co-efficient of friction of 75 per cent. But there are several other types of road surfaces with other co-efficients of friction. This means a different number of feet to stop, for the same vehicle, but on these different road surfaces.

So, rather than go to all the trouble of describing stopping distances on these different types of road surfaces, why not adopt a short cut and utilize a grade mark? For example, a four-wheel brake car might have its brakes adjusted to stop in from 16 to 18 feet on our standard road surface having a 75 per cent co-efficient of friction. On cool asphalt, the same car would stop in from 17.1 to 19.3 feet. On warm, sticky asphalt, the same car would stop in from 20 to 22.5 feet. It is the same car, with the same set of brakes, but it stops in different distances on different kinds of road surface.

But why bother to say all that? Why not say a car having this stopping ability is entitled to a grade-mark of B-4. "B" means second grade of performance. The "4" means four wheel brakes.

As a result of over 10,000 tests made during the spring of 1927, the Bendix-Cowdrey company suggested at that time the grading table (Table I) shown on this page, in which stopping distances given are as applying to smooth, dry, standard concrete road.

Recently, however, in collaboration with Dr. Stanley of the Raybestos Division of the Raybestos-Manhattan, Inc., the company has amplified this table to show the corresponding stopping distances on several other types of road surface. In the absence of anything better, several leaders in the industry have adopted this grading table and unofficially it is in use in several states. Its general adoption would mean that by the use of a symbol it would be easy to describe the stopping ability of a vehicle on most common types of road surface. It

(Please turn to page 33)

TABLE II—GRADING TABLE OF MOTOR VEHICLE BRAKE PERFORMANCE

From an Initial Speed of 20 Miles an Hour

(All figures given in feet)

FOUR WHEEL BRAKES

Grade	Between (1)	Between (2)	Between (3)	Between (4)	Performance Definition
A-4	18.7–20	16.1–17.1	15–16	14–15	Perfect
B-4	20–22.5	17.1–19.3	16–18	15–16.9	Excellent
C-4	22.5–25	19.3–21.4	18–20	16.9–18.7	Good
D-4	25–31.3	21.4–26.8	20–25	18.7–23.4	Fair
E-4	31.3–37.6	26.8–32.1	25–30	23.4–28.1	Poor
F-4	Over 37.6	Over 32.1	Over 30	Over 28.1	No longer a four-wheel brake car.

TWO WHEEL BRAKES

Grade	Between (1)	Between (2)	Between (3)	Between (4)	Performance Definition
A-2	37.6–40	32.1–34.3	30–32	28.1–30	Perfect
B-2	40–43.8	34.3–37.5	32–35	30–32.8	Excellent
C-2	43.8–50	37.5–42.8	35–40	32.8–37.5	Good
D-2	50–56.4	42.8–48.2	40–45	37.5–42.2	Fair
E-2	56.4–62.5	48.2–53.5	45–50	42.2–47	Poor
F-2	Over 62.5	Over 53.5	Over 50	Over 47	Vehicle unsafe on Highways

Note:—1—Warm, sticky asphalt; 2—Cool asphalt; 3—Cold asphalt, average concrete, good brick, COWDREY MACHINE READINGS; 4—Rough finish concrete.

These common types of road surfaces are assumed to be dry, smooth, level, clean and free from loose material.

DILL Super-Seal Valve Cap. Swiveled rubber seal—holds air.
DILL Instant-Air Tire Gauge. Parts completely enclosed. Guaranteed one-pound accuracy.
DILL Super-Seal Valve Inside. Fastest inflating valve inside made.
DILL Super-Service Air Chuck. Insures quicker inflation.
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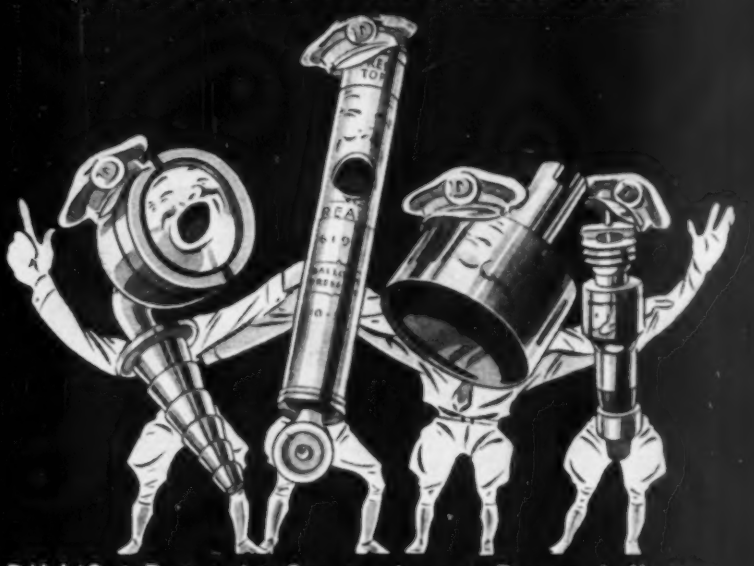
THE FOUR AIRMEN
for better air service



DILL'S 4-Point Air Service Insures Proper Inflation, Most Quickly, Checked Accurately, Sealed Tightly

Tires Always Properly Inflated Mean *More Running Time* for Your Fleet

It's simply good business for you to inflate tires properly—and to take every precaution to insure their staying that way! It means less "tire trouble"—less loss of running time—and protection for your profits!

You *need* The Four Airmen—for complete, efficient air service, all the time. Get them right away and use them with confidence—they're the *best*—they're made by Dill!

Insist on The Four Airmen from your local jobber.

Don't delay—mail the coupon today!

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I want to let The Four Airman help protect my profits. Send me your latest descriptive literature and an order blank.

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Say "I saw it in FLEET OWNER"—It Helps!

Deluxe Tractor *for* Caldwell's Fleet

Operator Adds Unusual Unit for Interstate Service — Deluxe Sleeper Cab and Coach Practice Featured

CARRYING out the theory that safety is directly dependent upon driver comfort, a new truck tractor, with a deluxe sleeper cab has recently been constructed for J. R. Caldwell of Detroit, to be used in transportation of rubber products between Akron and Detroit.

It represents an ideal which Mr. Caldwell has kept foremost in building up a transportation business which now keeps 17 trailers and 10 tractors continually on the road. This ideal is that trucking success is dependent largely upon the good will of the operating staff and that this good will can be built up only by providing the best in equipment, safety devices, and driving comfort. As a result, the driving personnel operating these trucks takes a pride in their upkeep, in obtaining performance records, and in maintaining the equipment in the best of condition. And the crew that will handle this newest of the Caldwell fleet has been picked for past performance.

Painted a deep maroon with crowned coach-type fenders and glistening with chrome plate, the unit presents the appearance of a deluxe parlor coach. The interior is also finished with a degree of luxury.

Every thought has been given to the comfort of the driving crew in this new unit. In order that the driver may not become tired, a specially designed seat has been installed with a double cushion and tied-down springs, while the back is constructed to shape the contour of the driver's back. Both the seat cushion and back are adjustable.

Ventilation is provided through fans at either side, while the windshield, constructed in two parts, may be opened at either side so that air circulation may be obtained without a chilling draft. Two cowl ventilators, two side ventilators and two combination light-ventilators in the roof complete this feature.

All of the windows and the windshield in this cab are constructed of shatter-proof glass. Special pains have been taken to provide maximum vision, with pillars made unusually narrow and doors and windshield deeper than usual. Two fire extinguishers are carried, one on either side of the cab and in easy reach of the driver and co-driver. The height of the steering column has been lowered four inches, providing the best possible driving position, and the steering post is adjustable.

For the comfort of the driver when resting during his relief on the trip, the berth in this sleeper cab is 75 inches long and 30 inches wide. The mattress is of the air-spring type.

As drivers in this cab will wear uniform, attention has been given to insuring their neat appearance at all times. Overalls are carried in a special compartment beneath the door, while a locker under the sleeping compartment provides room for whatever each man may wish to carry. A large chrome-plated rack overhead holds two suitcases.

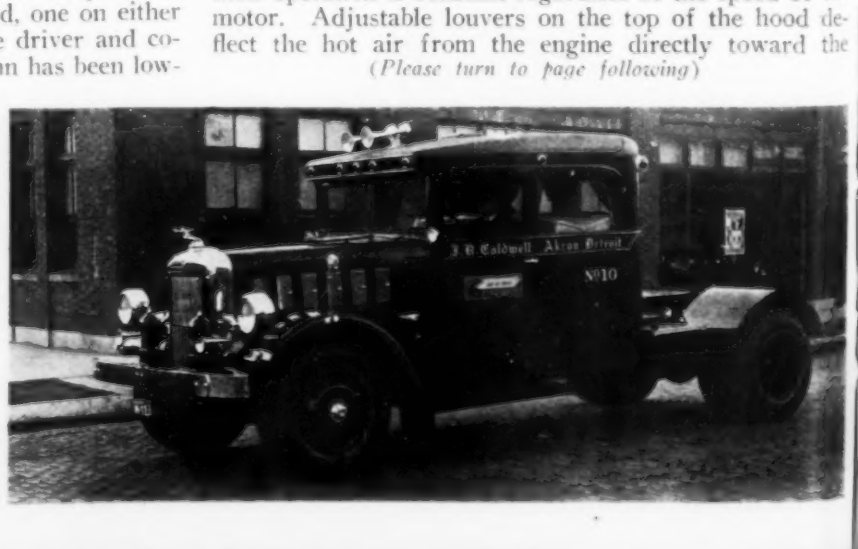
On the instrument panel are found the conventional instruments with the addition of a tachometer, an electric clock, an oil viscometer, and two manual controls for operating the dual shutters. Also, there are two electric fuel gauges, one for each 40-gallon tank.

The tachometer has been installed in order that the driver may check his engine speed at all times, while a governor prevents speeding the engine at more than 2000 r.p.m. Though the engine is capable of 2200 r.p.m., drivers of this truck are instructed to operate it at a speed not in excess of 1800, holding the extra 200 in reserve for emergency use.

As the truck will be used largely at night, a large spotlight has been installed at the right of the cab and placed so that it will shed its beam directly over the fender and at the side of the road. The spotlight is adjustable from the driver's position. Headlights are of chrome nickel and are attached to the heavy coach-type fenders exactly the same as in the deluxe motor coaches, while the shutter is also chrome plated and can be adjusted so that the lower part may be set independent of the upper section.

Two large dual air horns, both chrome plated, are placed on the top of the truck. Windshield wipers are of the air type with a constant variable speed, so that their operation is constant regardless of the speed of the motor. Adjustable louvers on the top of the hood deflect the hot air from the engine directly toward the

(Please turn to page following)



Drivers Compete for It!

THIS new tractor, described in the accompanying article, is only given to the best drivers in the Caldwell fleet. The drivers who take "No. 10" through every night (note the sleeper cab) do so with pride. It is their tractor. Its condition reflects upon them. As a result, they keep it bright and shiny and, according to Mr. Caldwell, go over the tractor with the same care that the engineman does with his "Twentieth Century Limited."

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IN EVERY industry, for every kind of hauling problem, Firestone Gum-Dipped Tires are making new records every day, setting new standards for safety, long mileage and low costs.

Firestone construction features make these records possible:

Gum-Dipping saturates and insulates every cotton fibre of every cord with live rubber and transforms the cotton cords into a tough, strong sinewy unit.

Two Extra Cord Plies Under the Tread give 56% stronger bond between tread and cord body, and 26% greater protection against punctures and blowouts.

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BEST DRIVERS GET NEWEST TRACTOR (*Continued*)

windshield, preventing the formation of ice. These may be closed in warm weather.

In the construction of the cab, duraluminum has been used in many places in order to reduce weight without any loss of strength. The frame for the berth is constructed of this material, while the interior of the cab is finished in leather.

A double 21-plate 6-volt battery is carried in a ventilated compartment at the left of the cab with a door opening on the side. Two spare tires are carried in a weather-proof compartment at the rear. Tires are of the 10.50/20 truck balloon type, using dual rears and single front. Unusually easy riding is a feature of this truck, with large air spring bumpers on front and heavy coach-type hydraulic shock absorbers on the rear.

The motor is the GMT 707 coach engine, equipped with counterbalanced crankshaft, harmonic balancer, dual ignition, dual carburetors of the down-draft type and dual fuel pump, these pumps being so arranged that one is held in reserve in case of failure and can be placed in operation merely by the simple changing of a connection in the fuel line.

Oil temperature on this motor is held to a minimum by an oil-cooler through use of which the oil is maintained at a proper temperature. This cooler is in reality an independent radiating system with water continually passing through its fin passages, cooling the oil as it passes through this cooler every two and a half minutes.

Westinghouse air brakes are used, operated by a pedal control so situated that it is necessary to move the foot only slightly. In addition to the foot control, lever operation is provided, the lever being so placed that it can be reached either by the driver or his relief.

The truck is equipped with a specially-designed 750-watt generator while the air compressor that operates the brakes is of 6 cubic feet capacity and automatically lubricated from the engine.

Easy gear shifting is obtained through use of a coach-type transmission, providing 4 forward speeds and one reverse. This, coupled with a 3-speed auxiliary transmission, provides 12 forward and 3 reverse gears. The axle is equipped with a worm-type differential and carrier assembly, giving a ratio of 5⅔ to 1. Easy access to the transmission is obtained through a trap door in the floor of the cab compartment.

Attention has been paid to the lighting. On front are the conventional three green lights, flanked by an amber light on either side, while side light on the rear corners may be switched on with an independent switch. On the rear is a 21-candlepower backing light so arranged that its beams are deflected directly upon the fifth wheel and couplings. Connections also have been made so that the stop light may be operated on the rear trailer. Reflectors also are provided. Two welded 40-gallon gas tanks, each equipped with protectoseal filler caps, give ample gas supply.

As this truck operates through several residential districts, unusual pains have been taken to insure quiet operation. Two large coach-type mufflers have been installed, with a cut-out valve between them controlled from the driver's seat, so that operation of the truck is as quiet as that of a passenger car. This unusual unit was built by the General Motors Truck Company, Pontiac, Mich.

DIESEL ENGINES *in* TRANSPORTATION (*Cont. from P. 14*)

unburned portion at high velocity through an orifice into the cylinder. This process is claimed to insure vigorous turbulence and results in complete combustion. The direct injection type is generally considered to be capable of higher speeds and greater power output; but the indirect injection type is considered to have better fuel economy and to be able to operate on a wider range of fuels.

Mercedes-Benz Diesel engines, with which Public Service Coordinated Transport have experimented, are of the indirect injection or pre-combustion chamber type. According to manufacturer's specifications, the compression pressure is about 500 lb. per sq. in.; maximum explosion pressure 600 lb. per sq. in.; and fuel injection pressure 900 lb. per sq. in. The fuel pump and injection nozzles are standard Robert Bosch products. The engine is started readily, even if cold, and the bus can be driven almost immediately; no long warming up period is necessary. Road performance is equal to that of gasoline buses of the same power, and the exhaust is practically colorless and odorless. In fact, laboratory analyses of the exhaust gas prove that carbon monoxide has been practically eliminated and Diesels are therefore preferable from a public health standpoint. These engines have been operated by numerous drivers and maintained by several garages, demonstrating that extraordinary care or skill in operation or maintenance is not required.

An important advantage of the use of Diesel engines is the elimination of the fire hazard in motor coaches, as well as in the storage, handling and transportation of the fuel. Another advantage is the elimination of the ignition system and carburetor, which would materially reduce the number of service interruptions. Failure of the fuel supply, due to vapor lock, which is experienced in some gasoline vehicles during hot weather, would, of course, be eliminated by the use of fuel oil. Notwithstanding the rather popular belief Diesel engines run at extremely high temperatures and thus require more maintenance, experience demonstrates cooling water and exhaust temperatures are noticeably lower than in gasoline engines.

When we consider the success being made by the Diesel engine in the marine and industrial field, and abroad in automotive service, it is only natural that automotive installations in this country are proving so encouraging. There remains, of course, much information to be learned by research and study before the Diesel reaches its final stage of development, which is not to be wondered at since the gasoline engine is still advancing.

There are indications of some activity in this country among manufacturers to produce Diesel engines suitable for truck and bus use, but operating experience appears to justify an intensive development that should soon produce satisfactory engines. A considerable attitude on the part of fleet operators and their substantial encouragement, amounting to a demand, will greatly hasten domestic Diesel development and thus allow all operators to enjoy the large benefits of Diesel economy.

(Editor's Note: This interesting article on Diesel Engines is abstracted and published by special permission of The American Electric Railway Association, at whose recent convention it was presented in the form of an intensive paper.)

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Solving Truck Tire Problems

By Wilson C. Bray

Modern Methods of Fast Distribution Demand a Minimum of Road Delays —Self-Sealing Tubes Seen as Aid

MODERN methods of distribution require modern means of transportation. Speed, reliability, and economy are of importance. Every part of the system must perform perfectly. Tires are one of the items of major importance.

Horse-drawn vehicles have been replaced by motor trucks because with the same investment it was possible to distribute much more merchandise with greater dispatch. Since much of the merchandise transported by many industries is perishable, the greatest possible speed with the least delay is imperative.

Tires are an important item in delivery expense, not only from the standpoint of tangible initial purchase price and maintenance cost, but to a great extent from the more intangible expense resulting from delay. The tire manufacturer has kept pace with advancing transportation methods by designing even better means of cushioning the loaded vehicles plying the highways of today.

This development has been a continuous race to provide more cushion with more miles, in spite of the increasing demands placed upon the tires through high speed and heavy traffic. There has been a steady parade from solids, through heavy duty cushions and high pressure pneumatics to the point where the majority of the new trucks are now equipped with low pressure balloon tires.

The problem of the fleet operator is somewhat more complicated than the average passenger car operator when buying tire equipment. In the first place, with the passenger car it is comparatively easy to determine beforehand rather accurately what the tire loads will be and for this reason it is seldom necessary to give the problem of oversizing much thought when buying a new passenger car tire. On the other hand, the truck manufacturer has little means of determining beforehand what the actual tire loads will be when his truck is finally placed in service.

For this reason, in order to insure the lowest possible cost per mile for tires, the purchaser of new trucks should give the matter of adequate tire equipment very careful consideration.

The passenger car owner, when he buys a new car, does not have to consider whether it is more economical to use single or dual equipment, or whether single or tandem axles, but the truck purchaser must decide which of these features most nearly fits his needs. It is quite possible that the type of tire which will perform satisfactorily on single wheel installations will not do so as a dual. For this reason careful consideration must be given to the type of tire to be purchased.

If the truck is to be one of a fleet, the problem of interchangeability is also important. Fewer tire sizes used in any given fleet reduce the amount of money tied up in spare tires. After the tire has been decided upon and purchased, the service which it receives at the hands of the maintenance crews and the drivers has a very great bearing on the utmost service which the tire equipment will render.

Inspection of any pile of scrap tires will show that most of them have failed before the treads were worn completely off. In a great many instances this was due to a lack of proper inflation. Others will be found where the tread is entirely worn off but they have given very low mileage, due to faulty mechanical adjustment of steering mechanism and brakes. Still other tires will be found which have been scrapped because of repair failures.

One of the surest ways to combat failure due to lack of proper inflation is the use of the "air container" or self-sealing tube, which has enabled hundreds of truck fleet owners to cut costs and increase trucking efficiency. They seal punctures on running wheels. They maintain correct air pressures and save mileage from the scrap heap. (Editor's Note: These are sometimes referred to, or designated by various manufacturers, as "puncture-proof" tubes.)

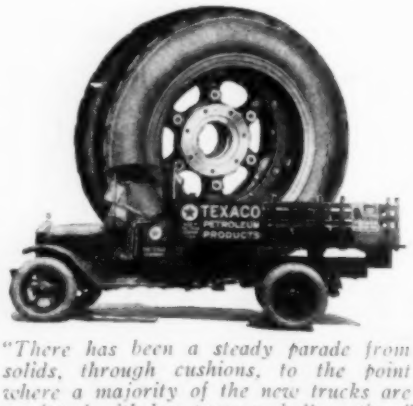
One of the unusual cases where this has been done has just been reported by Mr. J. A. Sanford, manager of the Ohio Match Company, Spokane, Wash., who has had a truck tire fitted with an "air container" travel 15,000 miles, pick up forty-two nails, screws, etc., and never lose a pound of air.

All of these items of improper care tend to increase distribution costs, as well as make for high fleet maintenance costs.

One of the great problems of any fleet operator, therefore, is a method which will stop the leak due to excessive tire expense. There are a great many systems used at the present time by various fleet operators to record tire expense and a great many of them are not without merit.

The B. F. Goodrich Company (of which the writer is Manager of its truck and bus tire sales department), has spent a great deal of time and effort to develop a system of obtaining and recording

(Please turn to page 35)



"There has been a steady parade from solids, through cushions, to the point where a majority of the new trucks are equipped with low pressure balloon tires."

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Date Name_____

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QUESTION of the MONTH

"By far, one of the most valuable departments to be found in any automotive publication. Every fleet man should be delighted to cooperate."—A Reader

Here Are a Few Representative Answers to Questions No. 17 and 18:

Uses Tire Chains on All Vehicles

"TIRE chains are used on all types of tires and vehicles in our fleet. We find the continuous type of steel chains most satisfactory; the two-link cross-chain spacing is best for heavy trucks. On dual pneumatics, we have to use single chains on the outer tires only.

"We have experienced some difficulty on Ford trucks, where the space is very narrow and the tire sizes were increased. This has decreased the clearance necessary for the tire chain installation. We have a bench machine and some hand tools for repairing tire chains in our own shop; the chains are purchased through jobbers.

"We have overcome some of our trouble by making changes in the rim locking rings. On some jobs we have had to use Budd spacers last winter."—*G. E. Bickert, Foreman Auto Dept., Phila. & Reading Coal & Iron Co., Pottsville, Pa., operating a fleet of 20 trucks, 9 ambulances, 76 passenger cars and 6 motorcycles.*

Dual Chains for Dual Pneumatics

"ALL of our vehicles are equipped with pneumatic tires and we use the continuous type of steel chain on same, with two-link spacing of the cross-chain on the cars and 4-link spacing on the trucks. We are 100% equipped with tire chains.

"We have had some difficulty with spacing for chains—the clearance between the inner rim and spring is often insufficient. We use both single and dual chains on dual pneumatics, but our experience is that both tires act better when equipped with dual chains. In emergencies, we repair tire chains in our own shop."—*E. L. Bell, Supt., Deep Rock Oil Corp., Drumright, Okla., operating a fleet of 15 trucks and 100 passenger cars.*

"Gauged by Load and Road Conditions"

"TIRE chain requirements should be gauged by road and load conditions. We use tire chains on single pneumatics and on solids but not on dual pneumatics, the continuous type of steel chain being most satisfactory. We use the 4-link spacing for cross chains and see no difference between the 2 and the 4.

"Our experience has been that on dual pneumatic jobs there should be more wheel housing clearance. With regard to dual chains on dual tires, this depends on the nature of the service. Our busses use outside chains only; the trucks use dual chains in bad roads.

"We repair tire chains in our own shop, using a Dreadnaught tire chain tool. Chains are purchased through automotive jobbers."—*N. W. Glass, Supt. Automotive Equipment, Indiana Service Corp., Ft. Wayne, Ind., operating a fleet of 70 trucks, 11 busses and 30 passenger cars.*

Fleet Is 100% Equipped

"CONTINUOUS type of steel tire chains is used on the pneumatic tires of our truck fleet, which is 100 per cent equipped with chains. The cross-links are spaced every four links apart. We have experienced no difficulty in using chains on dual pneumatics; in fact we use dual chains on these jobs, because single chains on the outer tires will dig down until the inner tire rides—the result, no traction.

"We repair tire chains in our own shop, using new cross links and sometimes welding the cross-chains to the side chain."—*F. K. Jory, Supt., Wilson Transportation Co., Sioux Falls, S. Dak., operating a fleet of 50 trucks.*

This Bus Fleet Believes in Chains

"WE use the continuous type of steel tire chains on our fleet, including the dual pneumatics, all vehicles being equipped with chains when necessary. The two-link spacings for cross chains are used, giving best results. We have had no difficulty in using chains on dual pneumatics, and use them on the outer tires only.

"We repair tire chains in our own shop, having miscellaneous equipment for doing this work. We buy chains through automotive jobbers."—*K. L. Conner, Supt. of Equipment, Jamestown Motor Bus Transportation Co., Jamestown, N. Y., operating a fleet of 4 trucks, 22 busses and 6 passenger cars.*

"We Keep a 100% Stock on Hand"

"WE use the continuous type of steel tire chain, with the 4-link spacing, as we do not think the extra cost for the 2-link cross-chain spacing justifies their use—at least not in this part of the country. We keep a 100% stock on hand for any emergency.

"On dual pneumatics, we find that chains on the outside wheels only will give plenty of traction. We use chains on solids as long as there is snow on the ground. Chains are purchased through the automotive jobber and Weed equipment is used for repairing tire chains in our own shop."—*Wm. G. Bauer, Supt. of Delivery, C. D. Kenny Co., Baltimore, Md., operating a fleet of 31 trucks.*

Short and Sweet

"WE use tire chains on our fleet of trucks; on the single pneumatic tires of White trucks. The 3-link spacing of cross chains is preferred. We repair tire chains in our own shop, using the Weed chain bench tool. We buy tire chains through the automotive jobbers."—*Thos. Lairnio, Garage Supt., Continental Baking Co., Mt. Vernon, N. Y., operating a fleet of 45 trucks.*

(Please turn to page 31)

Now Highway offers

HIGHWAY TRAILERS

Speed

Safety

Economy

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The HIGHWAY TRAILER Co. EDGERTON - WISCONSIN.

HIGHWAY TRAILERS

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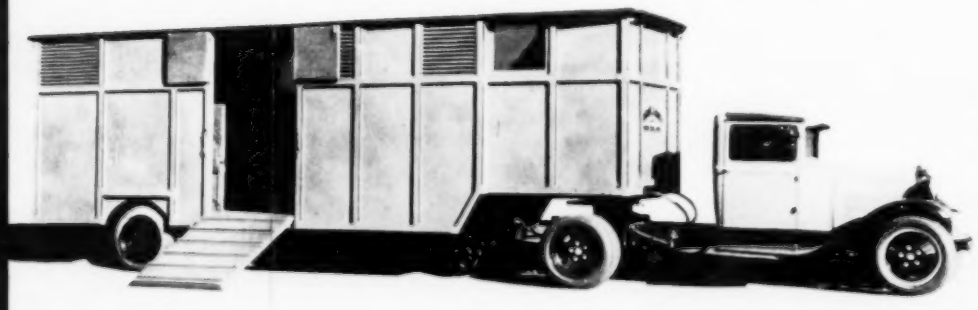

Do not be misled. Highway livestock trailers are designed and built to meet the stock man's problem for a safe, rapid, reliable and economical transportation unit. Ask the man who drives one.

Simplicity of construction means ong life and safety. Springs without shackles, radius rods that are ally oscillating and adjustable, and spring cushion, electric steel, ear proof quick detachable rock- g fifth wheel are exclusive High- ay features.

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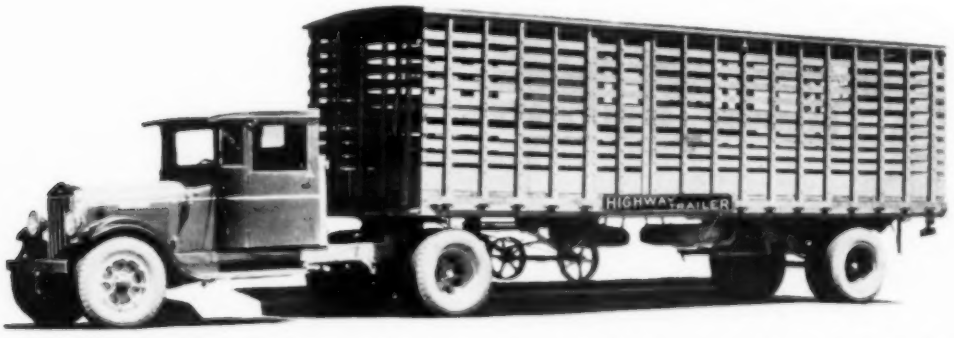
STOCK TRANSPORTATION . . .

Whether you are hauling your own livestock or for others, long hauls or short, Highway Trailers will save you time and save you money. No other trailer will serve you half as well—Highway trailers cost you less and pay you more. They are lighter, stronger, simpler in construction, and less expensive to run. With Highway Trailers you can "pocket the profit."

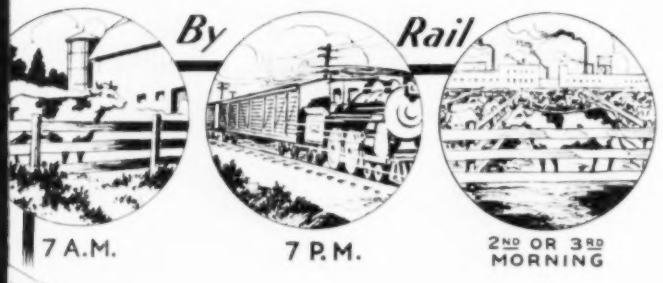


HIGHWAY TRAILERS

Equilibrium--through positive fifth wheel balanced construction

COMPLETE *from raw material to finished product*

21 Million *head of livestock were trucked to 17 market centers in* 1931 . . . . HIGHWAY *Gives You* •



Livestock Delivered With Highway Trailers Means

1. **Quicker Marketing—**
2. **Better Prices—**
3. **Less Shrinkage—**
4. **More Profits—**

1. **Interchangeability of trailer equipment.**
2. **Engineered construction.**
3. **Dual safety features.**
4. **Greater payload.**
5. **Easy rolling.**
6. **Flexibility of operation.**
7. **Completely manufactured within our own plants.**
8. **Strength with light weight.**
9. **Continuity of service.**
10. **Highway Trailer Engineering Service to its clients.**

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EDGERTON WISCONSIN . .

The World's largest Custom Body

QUESTION - *of* - *the* - MONTH CLUB *(Continued)*

"Drivers Like Shutters Very Much"

"ONLY the passenger cars in our fleet are equipped with radiator shutters. These are of the automatic type and were standard factory equipment on the cars. The drivers like them very much, as they get easier starting and other advantages therefrom, and the shutters really do help the performance.

"On our trucks we use a piece of cardboard over the lower portion of the radiator core, to keep the motors warm. In our opinion, on trucks and busses where the drivers are dependable, the manual-control is better than the automatic."—*J. T. Latta, Foreman, City of Durham Garage, Durham, N. C., operating a fleet of 32 trucks, 15 passenger cars and 10 other vehicles.*

Decides to Discontinue Shutters

"ABOUT three or four years ago we decided to purchase shutters for the cars which we were then operating, mostly Pontiac and G. M. C. half-ton panel delivery units. We purchased a type which was controlled by the driver with a hand-control, but after using these shutters for a year or so, we decided to discontinue same, as there was quite a bit of work involved in installing them when the cold weather set in, and later on in removing them so that the car would not overheat in the warm weather.

"Furthermore, the salesmen oftentimes forgot to open the shutter after they had started their cars, with the result that many of the men had their radiators boil over and cause minor damage to the finish of their cars. All in all, we have not found it necessary to use shutters on our machines.

"We have found it helpful to put cardboard underneath the hood of the car, as well as covering the lower portion of the radiator in cold weather, as this causes the engine to warm up quicker. There was no noticeable saving in gasoline during the time we were operating our cars with radiator shutters."—*A. A. Heinz, General Cigar Company, Chicago, operating a fleet of 175 cars, mostly Fords and Dodges.*

"Shutters Needed with Heavy Oil"

"ABOUT half of the vehicles in our fleet are equipped with shutters of the manual-control type, including trucks and passenger cars. Since our trucks use very heavy oil all winter, it is necessary to keep the motors warm and shutters do the job very nicely. No other methods are used to keep the engines warm. We see no reasons why shutters should not be used on any type of automotive vehicle. We prefer the manual-controlled shutters over the automatic."—*Daniel J. Varady, Manager, Varady Trucking Co., E. Chicago, Ind., operating a fleet of 20 trucks, 5 passenger cars and 25 trailers.*

(Please tear out and mail to The Editor, The Fleet Owner, 90 West St., New York City.)

Question No. 20—Wheel and Axle Alignment

Is Wheel Alignment included in your preventive maintenance work? .....

How often are your vehicles checked for same? .....

What system (or equipment) is used for this work? .....

What method is used to check and correct the following?

Toe-In?	Bent Front Axles? .....
Camber?	Tracking? .....
Caster?	Bent Frames? .....

How do you straighten bent front axles?

In Car?	Out of Car? .....
Hot?	Cold? .....

What wheel alignment equipment have you? (Please check)

Wheel aligning gauge	Spindle gauge .....
Caster or axle gauge	Tracking gauge .....
Toe-in gauge	Others .....

It is necessary to check and correct caster, before attempting to check for toe-in. Is this procedure followed in your shop? .....

An interesting Service Manual on Wheel & Axle Alignment (also a specification chart for all cars and trucks) is offered free to those answering this questionnaire. Shall we send you a copy, gratis? .....

How many vehicles in your fleet?

.....Trucks: .....Busses: .....Pass. Cars: .....Trailers: .....Others.

Help to keep this Department a Success! Swap Your Wheel Alignment Experience With Other Fleets.

Name of Firm .....

Address .....

City and State .....

Your Name .....*Position*.....

Applying Standardized Rims

In Which Is Discussed the Proper Service Application of Truck and Bus Standardized Rim Sizes

By Wes. D. Smith,
(President, National Wheel & Rim Association)

A GREAT deal of mystery, so-called, seems to surround truck and bus rim equipment. This mystery, (or shall we call it fear?) seems to have become greatly intensified since the introduction of both dual pneumatic equipment and bus balloon tires, and I feel that if I can present in a simple understanding manner the uses and adaptation of the standardized rims which the rim manufacturers have made available, that I will not only have accomplished a great deal, but I am sure that I will have eliminated much of the mystery and confusion that now seems to exist—and which after all is more occasioned through lack of knowledge.

For the moment I am going to romance and take you back to 1920. Here I am going to present to you the introduction of not only standardized truck equipment, but possibly most important—standardized and interchangeable truck equipment in the shape of the type "B TT" rim and type "K TT" rim. Both of these types are made in all width sizes, and the two common diameters known at that time, i. e. 20" and 24" diameter wheels, and in addition to being standardized, carried a more important feature of standardized interchangeability—making it possible to apply either type or make of rim to the same diameter wheel, or the same felloe band.

These two rims were the gold standard of the truck rim equipment. They survived a long and successful life. They, however, like much other equipment, had to give way to progress and the demand for high-speed pneumatic transportation, which in itself called for a multiplicity of tires as protection to the payload.

With the introduction of dual tires came many additional problems to both the wheel-maker and the rim-maker. These problems were first combatted with the introduction of the type "BO" rim, a modification of the "B TT" type through the elimination of the inside ridges and the gutter to permit what is known as a single bevel mounting, and today are standardization on all wheels of the demountable rim type whether they be single or dual, and is accomplished through the mounting of a 28 degree bevel.

Were we to end with the "BO" type of rim we would have practically no problem to contend with, as this rim is so universally designed that it covers the entire range of tire sizes, widths, and diameters. But, unfortunately, cost enters into the manufacturing adoption of practically every item, and the "BO" rim, being built to a standard of quality and not to a price, did not fit well in this program for use on medium light, or medium heavy-duty trucks, with the result that new designs, and of course new weight sections, were required. Now we have the introduction of the "DT I" rim for light, or medium light trucks, consisting of a solid piece, permanent back flange, with a combination single loose side lock ring, and the "R" type for medium-duty trucks and over-sizing purposes as applied to the "DT I". The "R" type rim is a solid base, one-piece type, with permanent back flange, but with a solid one-piece side ring and a split lock ring.

I want to emphasize the fact that we now have a truthful standardization of rim equipment. However, with standardization also comes a series of abuses, and by that I mean misapplication—possibly due in many cases to cost of installation, but in a majority of cases due to over-sizing and double over-sizing without any regard to the rim base which is the foundation of the super structure.

If it were possible for the tire engineer to build, for example, a 40 x 8 tire with the same size foot or bead, as it is commonly called, as a 30 x 5 tire, we would have probably no trouble from interchangeability. But, unfortunately, as tire sizes themselves advance, so must the bead advance. So admitting that it is necessary that every size tire have a correspondingly larger size bead, so it should be understood that each width rim must proportionately have a larger size flange.

What an important factor rim widths and flange heights are, when attempting to put a larger size tire on a rim not originally designed to carry the larger size. For the sake of easy computing, let us take a 7" normal rim, which actually measures 5.00 inches in width between flanges and has a flange height of 1.312 inches. Now a normal 8" rim with a width of 6.00 between flanges, and a flange height of 1.500. If we were to mount an oversize tire, which should normally be applied to an 8 inch rim, on the 7" rim which I have just described you will note a difference in width of one inch, or actually 20 per cent, and a difference in flange of almost one-quarter inch. This condition of misapplication might be likened unto your attempt to put your own feet into a pair of shoes one full size too small in length and one size too small in width. Fortunately for you the discomfort will very quickly cause you to remedy the misapplication. But unfortunately with tires and rims, no human element enters, there-

(Continued on page 33)

fore, the abuse experienced can only mean one or two things—either rim failure or tire failure, or both.

I would like to warn operators against the misapplication of tires due to over-sizing or ballooning without regard to normal rim widths, or heights. I would caution the tire men in particular to carefully consult their tire manuals as to proper rim widths before making any recommendations as to oversizing, etc. And above all, do not make snap judgment in the condemnation of a rim unless you are sure that you are not a party to its abuse. It is no more than fair that we respect the ability of not only the engineers who are specializing and designing rim equipment, but the engineers who designed and built the truck and made certain adaptations—all of which were taken into consideration to fabricate a certain size and type unit.

Engineers who design, and manufacturers who build a 1½ ton truck do not as a rule claim 3-5 ton capacity or performance. And the simple expedience of changing tire sizes to increase carrying capacities usually works to the safety of over-capacity limits of the vehicle, eliminating then all safety factors.

In my discussion of truck and bus rims, so far I have purposely omitted what is known as the Type "K" Rim. This particular rim was introduced to the trade early in 1928, presenting a new innovation in the form of a single bevel rim, consisting of two parts: (1) A continuous side ring. (2) A diagonal split base. This rim when presented was designed for an 18 degree bevel mounting, providing complete interchangeability in all of its own sizes, but not with any other existing rim. Due to the increased popularity and demand for dual-equipped trucks ranging from the smallest to the largest capacity, a very serious situation arose due to lack of interchangeability, resulting in heavy inventory investments on the part of both the truck and bus manufacturers and the wheel-makers. After serious consideration to this important subject the "K" type rim was re-designed, changing the bevel mounting from 18 degrees formerly, to 28 degrees—completing not only the standardization problem, but most important of all a complete interchangeability with all existing types on the same wheel. And now while we have only four distinct types of rims, each designed for its own particular problem, we have a complete interchangeability, which if properly applied will eliminate any unjust complaint or criticism.

(Editor's Note:—This article originated as a talk given by Mr. Smith before the Southern California Section of the S. A. E., recently. It has been abstracted for use in this publication with special permission.)

Is "Brakes O. K." Sufficient?

(*Continued from page* 18)

is merely a matter of acceptance through common usage. This table is designated as Table II and is also shown on page 18.

It is our belief that "Brakes O.K." is due for the discard along with whip sockets, two cylinder engines, rear entrance tonneaux, hand cranking and other elements of the motor vehicle that we recall only with amusement.

If fleet owners and the motoring public are to be impressed with a keener appreciation of modern brake service, then we in the brake industry must take the lead in instructing them before they begin to laugh at us for our lack of knowledge of our own subject.

Protect your Work with
VELLUMOID GASKETS

As you know, whether you use the sheet or ready-cut gaskets, you can always rely on Vellumoid to make tight connections which ***stay tight.*** The quality is uniform—always the same tough, yet compressible gasket, which stands the gaff of the hardest service. When Vellumoid gaskets cost so little and mean so much, why not use them and have the best.

Stock Vellumoid ready-cut gaskets for the cars, trucks, or busses in your fleet and sheet Vellumoid from which you can quickly cut or tap out any gasket desired.

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VELLUMOID
THE REAL
REPLACEMENT GASKET MATERIAL

For the Oil, Gasoline, and Water Connections

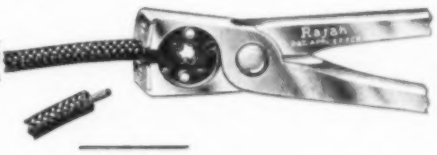
The Vellumoid Co., Worcester, Mass.

You Save Money

on rewiring jobs by using the new **Rajah** Hand Crimping **Tool**

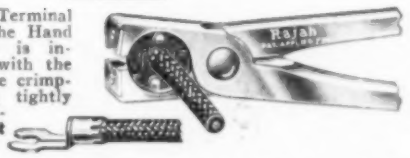
This new tool crimps Rajah Terminals to ignition cable without the use of solder or any other tool. Note the simplicity of using it.

(Right) The cutter on end of Tool will remove just enough insulation.



(Left) Bend the exposed wire strands over end of Cable, then insert into ferrule of Terminal.

(Right) Now crimp Terminal to Cable by using the Hand Tool—The Terminal is inserted in the Tool with the ferrule flush with the crimping jaws—Compress tightly and you have a positive and **permanent** connection.



Tool with neat metal box containing 250 distributor terminals and 253 assorted spark plug terminals, $11.20. Tool alone $4.00.

THE RAJAH COMPANY, Bloomfield, N. J.

Send this coupon with your letterhead or business card for our special offer. You are sure to receive an unusual present. No obligation.

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☐ Proprietor ☐ Service Manager ☐ Shop Foreman ☐ Mechanic

A Few Battery Charging Hints

By H. L. Floyd

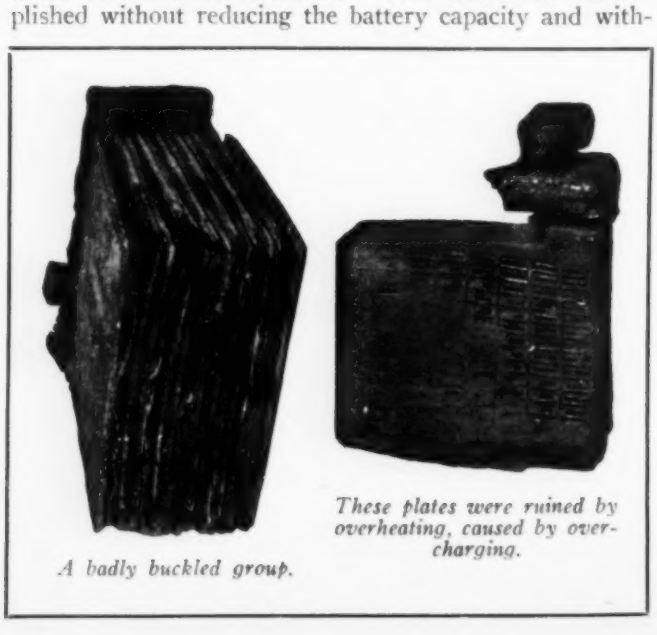
A FULLY charged battery will read 1,300. Bear in mind, however, that continuing to put current into a fully charged battery generates excessive heat, which is harmful to the battery.

Don't be afraid to set generators at a low charge rate. If a five-ampere charge rate will keep the battery properly charged, do not use ten amperes. If you do, it will be necessary to repair or replace the battery prematurely.

Remember that a battery discharged by reason of using too low a charging rate of the generator can be easily recharged; but a battery which has been continually overcharged is in many cases damaged beyond repair. Two or three months of constant overcharging will ruin a battery.

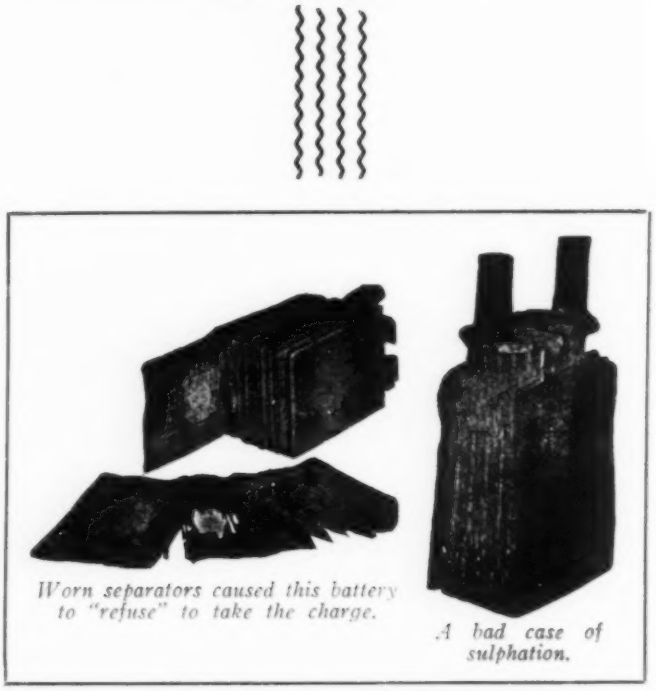
When a battery needs recharging, it is wise to determine whether some condition other than a low charge rate is responsible. To jump to the conclusion that the rate is too low may mean that you will ruin a good battery by aggravating the condition which originally caused the trouble.

Without question, more batteries are brought to an untimely end through conditions of overcharge than from any other cause. From this there seems to be slight hope of relief. One effective measure of protection against the effects of overcharge and concentration of acid, through neglect to water the battery, is to be had in providing a large water space above the plates. It has been found possible to increase the water space above the separators so that there is four times as much liquid above the separators as is to be had in the usual standard construction. This has been accomplished without reducing the battery capacity and without lowering the height of the plates, separators or bridges, and also without altering the overall dimensions of the battery.



A badly buckled group.

These plates were ruined by overheating, caused by overcharging.



Worn separators caused this battery to "refuse" to take the charge.

A bad case of sulphation.

As a result of this design which provides for a larger volume and higher level of slightly lower gravity electrolyte, it is possible for the battery to be overcharged and safely neglected for much longer periods of time—months, instead of weeks, as has been the custom. Barring willful abuse, whatever the owner's habits may be, he is now permitted a four-fold measure of neglect.

To offset the tendency to overcharge batteries, there is rapidly developing an increased discharge and use of the battery for the numerous auxiliary "gadgets" and electrical conveniences such as higher candlepower lamp bulbs, spot-lights, cigar lighters, electric fans in hot water heaters, radio receivers, and now rumors of electric brakes. To encourage a freer use of the storage battery on the automobile would result in the more frequent replacement of storage batteries and would tend to place a new and proper emphasis on the correct battery size and capacity, and would place a much needed premium on the life of batteries of the higher quality.

If the generators on the present day cars were hard-put to keep up with a more generous use of the battery, the deficit in ampere-hours could very easily be made up by the supplemental use of an external charger mounted on the dash or garage wall and readily plugged into a convenient light socket or receptable in the car for an occasional overnight boosting of the battery. Eventually, of course, car generators would be increased in size to meet the demand.

(EDITOR'S NOTE: *Mr. Floyd, the author of this article, is Service Manager of the Prest-O-Lite Storage Battery Sales Corp., Indianapolis, Ind.*)

To Modernize Army Trucks

CONCURRENT with the general economy program inaugurated by the National Government, several hundred war model trucks will be returned to active service in the near future. Following the modernization of 96 of these units, a recent order by the Secretary of War calls for the complete overhaul of 140 more FWD ordnance trucks, bringing the total to date to 236. The present shortage of cargo transportation will be at least partially eliminated by this program.

The trucks, taken from storage at the Erie Ordnance Depot, will be thoroughly overhauled and, insofar as possible, be brought up to date with modern equipment. The changes necessary will include new wheels with pneumatic instead of solid tires, modern carburetors, flexible fuel and oil lines, as well as the installation of oil pressure gauges. Wooden cargo bodies will replace the present steel ordnance bodies.

When these trucks roll off the floor at Holabird Motor Transport Shops, they will represent a fairly modern vehicle, comparable to many present-day trucks. They have heavy-duty four cylinder motors, three-speed jaw clutch transmissions, full-floating bevel gear axles, and four-wheel brakes. The fact that such a small expenditure brings these fifteen-year-old veterans up to date speaks well, indeed, of the ability of army engineers and mechanics.

To Save Trailers from Scrap-Heap

MORE than 35,000 brakeless trailers now endangering motor traffic will be ruled off the highways this year by legislative action in many states, P. W. Hood, vice president of The Timken-Detroit Axle Company, said before a recent meeting of automotive equipment makers.

"The high speed with which trailers are moved over highways makes it imperative that they have adequate brake equipment as a protection to motorists," Mr. Hood said. "This need is being recognized by the enactment of trailer brake legislation in many states. During the present year, a large number of brakeless trailers will be scrapped by state laws unless they are equipped with efficient braking systems.

By substituting a newly developed brake-mounted axle for the brakeless axle with which the vehicle was originally equipped, it is now possible to convert a brakeless trailer into a transport unit that will meet every legal requirement. Because of this development, many brakeless trailers which are in good condition, except that they have no brakes, will not only be saved from the junk pile, but the highways will be cleared of dangerous inadequately-equipped vehicles."

(*Editor's Note.*—Interesting change-over data applying to trailers can be secured free of charge from the Editor of this publication.)

Solving Truck Tire Problems

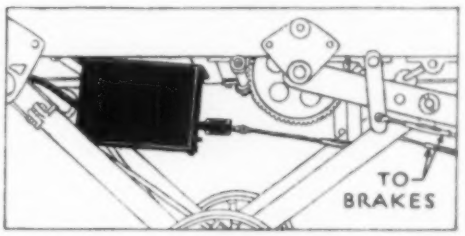
(*Continued from page 24*)

tire costs which may be adapted to the many cost systems used by fleet operators. The complete description of the plan, known as the Goodrich Tire Mileage Cost Plan, is available to any fleet operator upon request and if necessary, personal instruction and supervision is available for its installation.

For complete information, fleet operators can address the B. F. Goodrich Rubber Company at Akron, Ohio, or the Editor of this publication, who will see that the proper care is taken of each individual inquiry. There's no obligation, of course.

LITTLE GIANT BRAKE BOOSTER

STOPS LIKE LIGHTNING



From 40 Miles Per Hour to Dead Stop in 37 Feet

The Little Giant (Electric Control) Brake Booster acts almost instantly either in applying or releasing brakes. Cannot freeze up in zero weather. Made for trailer, train or trailers, heavy trucks, busses, etc. Operates with any type brake except electrics. No upkeep cost, takes less current from battery than blowing horn. No expert attention needed. Has three times the necessary draw bar pull. A GUARANTEED LITTLE GIANT PRODUCT. Low in cost.

LITTLE GIANT PRODUCTS, Inc.
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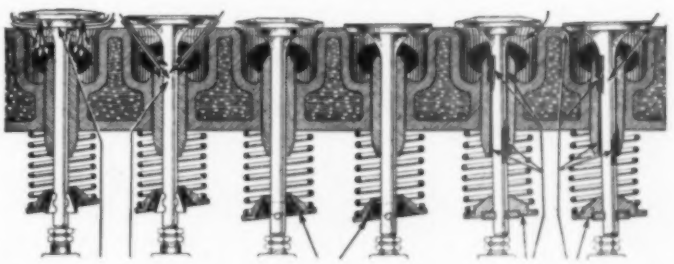
UNIFORMITY MULTIPLIES DURABILITY, EFFICIENCY *and* ECONOMY



With our flat seat valve the heat is deflected from the stem and guide, whereas with taper seat valves the heat is directed to the stem and guide, causing valves to stick, stay open and warp; expensive replacement results.

Our valve spring tension equalizer provides the all-important uniform contact and heat dissipation necessary in order to eliminate excessive wear and obtain and maintain maximum economical motor performance and maintenance.

The ordinary spring retainer is held rigid on the lock at right angle with the valve stem. Due to the always existent unequal spring tension, uniform contact is impossible and excessive wear at the above arrow indicated points, results.

BOYLE VALVE CO., 5828 So. Ada St., Chicago

Please send free literature on valves and spring tension equalizer.

BOYLE MOTOR PRODUCTS

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More About Crankcase Sludge

By Robt. P. F. Liddell*

Engineer Points Out the Part Played by Oil Filters in Minimizing Sludge Formation in Automobile Crankcases

THIS has been a benign winter to operators. From its start they have been warned, through the columns of various journals devoted to their interests, against the danger of sludge formation in the crankcases of their machines, a hazard always present and made doubly threatening by low temperatures. And the weather, for several months, remained unseasonably warm!

The sudden arrival of sub-freezing temperatures, coming in the month of March, may make timely the suggestion that no operator need longer fear the formation of sludge in his motor, whether in cold or hot weather, if their service men will see to it that their motors are equipped with adequate oil filters. It is perfectly true that an oil filter will not strain out the sludge from a motor but *it will strain out the substances without which sludge cannot form.*

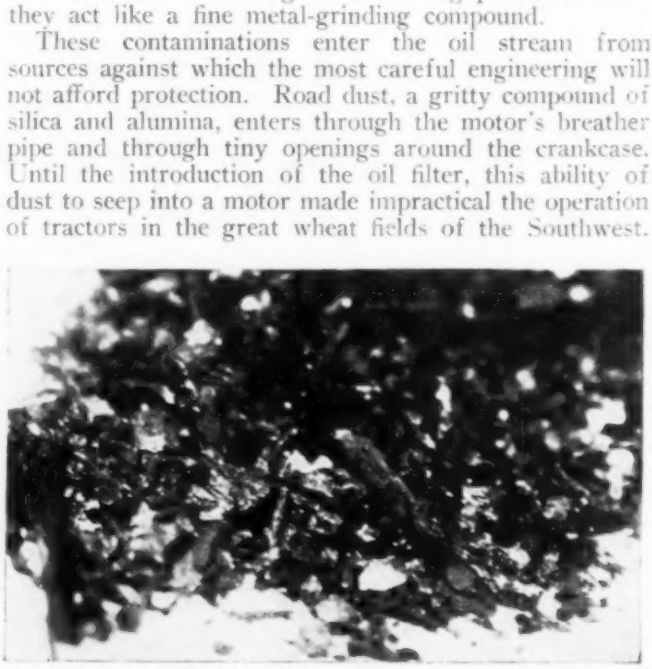
Some knowledge of the character of sludge and of its formation is necessary to an understanding of the filter's successful operation. Readers of this publication are already familiar with the subject from the excellent article in a recent issue by A. H. Frost, on "How to Minimize Sludging." They know that sludge is the gummy, pasty substance, slimy and sticky to the touch, which they have scraped and washed out of countless crankcases. They know that it is filled with abrasive particles which put undue wear upon the bearings and working parts of the motor. They know that, once formed, sludge can be removed only by cleansing the crankcase and filling with new oil.

Mr. Frost was at pains to explain that sludge in crankcase oil "is really an emulsion formed by water in the presence of road dirt, carbon and minute metal particles such as are always present in an engine crankcase," but it is open to doubt that the average operator realized the converse of this statement; that *except* "in the presence of" those substances Mr. Frost described, sludge *cannot* form. Deprive the oil stream of these particles and you deprive it of the power to create sludge!

All the ingredients of sludge, except these cores or nuclei, around which sludge builds up, and the water necessary to an emulsion, will continue in the oil stream but they will be harmless to the motor. Without these cores to which to cling, the water will fall to the bottom of the crankcase, unable to remain in suspension in the oil stream. Amorphous carbon will continue to discolor the oil and to be carried to the bearings and working parts of the motor but amorphous carbon is a form of graphite and itself a lubricant. It will improve rather than injure the quality of the oil.

The particles on which sludge builds up and which the filter removes, comprise minute bits of silica and alumina, tiny chips of metal and of hard carbon which are constantly being introduced into the oil stream from a variety of sources. Even when frequent cleansings of the crankcase and replenishment with fresh oil prevent the formation of sludge, these particles, nevertheless, if the oil be unfiltered, are carried along in the oil stream to the detriment of bearings and working parts on which they act like a fine metal-grinding compound.

These contaminations enter the oil stream from sources against which the most careful engineering will not afford protection. Road dust, a gritty compound of silica and alumina, enters through the motor's breather pipe and through tiny openings around the crankcase. Until the introduction of the oil filter, this ability of dust to seep into a motor made impractical the operation of tractors in the great wheat fields of the Southwest.



A highly magnified photograph of abrasive materials filtered from the oil stream of the engine of a passenger car.

It is on record that motors were destroyed in a single day of operation. With every possible precaution taken against the entrance of dust, motors, if they ran at all, did so for only brief periods and at the expense of complete changes of oil two and three times a day. The oil filter changed all that. Today tractors give continuous service, through season after season, with only the usual care demanded by a motor-propelled vehicle.

This same sort of dust, though less of it, of course, enters every motor that drives along our streets and avenues. You need not take the car into the country to find dust; and core sand, another of the contaminating substances, is present in every motor built. This is the sand used for moulding when engine parts are cast and, despite the most meticulous efforts by manufacturers to remove it, this sand has the property of remaining in the outer film of the metal until dislodged into the oil stream by the operation of the motor. The bits of metal come, of course, from natural wear in the motor; hard car-

* *Chief Engineer, Motor Improvements, Inc., Newark, N. J.*

DON'T CURE IT - - PREVENT IT! (*Continued*)

A bleeder-type oil filter, showing an unused filtering element, the container which carries it and the used element taken from it after approximately 8,000 miles of operation.

bon, very different from the amorphous carbon always present in the oil stream, is a natural product of combustion formed upon the bottom of the pistons. All these particles yield readily to proper oil filtration.

The science of filtration as applied to the engine oil of a motor car is relatively young. Its development was delayed long after engineers had recognized the necessity for it, because of special problems of adaptation. These related largely to the necessity of operating with a limited filtering surface but revolved also around the fact that the crankcase of the ordinary automobile motor has a capacity for only six or seven quarts of oil.

Proper lubrication of present-day motors requires the delivery to bearing surfaces of from 100 to 250 gallons of lubricating oil per hour, depending upon speed. This tremendous volume must be supplied by the repeated use of the contents of the crankcase, so it is evident that the total crankcase content must be forced to the bearings and brought back to the crankcase at least about once a minute and sometimes as often as once each 25 seconds.

Here in itself was an urgent argument for filtration, for this tremendous speed of circulation invited quality deterioration and sludge formation. At the same time this very speed appeared at first to render impossible any application of filtration, for filtration depends primarily upon a relatively slow movement of the substance to be filtered, lest bits of the very substance sought to be removed be carried through the filter.

Laboratory experiments finally determined the fact that filtration of crankcase oil at the rate of ten gallons per hour by the bleeder type of filter, was adequate to keep the contents of the crankcase free from contamination even though it be used over and over again at a rate as high as 250 gallons per hour. The task of filtering even this volume at a rate anywhere nearly slow enough to insure proper filtration, and in a filter small enough for installation on a motor, remained unsolved until there was conceived the idea of confining a relatively large filtering surface within a relatively small container by application of the accordion or coil principles.

Our bleeder type of filters (approximately 4½ inches in diameter and from 5 to 9 inches in height), now contain filtering surfaces ranging from 288 square inches to 546 square inches. Enough oil per minute to equal ten gallons in an hour can be passed through these surfaces with a movement equal to only about 1/10 of an inch per minute—a pace so slow as to be almost imperceptible to the eye and equal actually to the rate of movement of the hour hand of an ordinary watch.

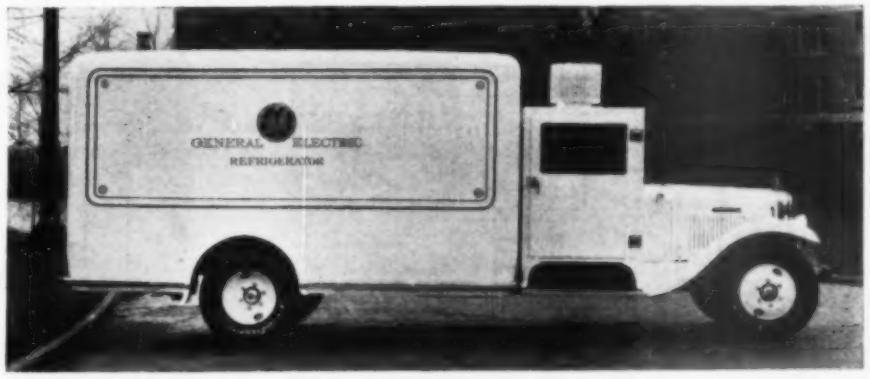
Acceptance of the oil filter by motor manufacturers has extended so far that approximately 70 per cent of the motors shown at this year's automobile exhibitions were filter-equipped, and the presence of an oil filter upon many models introduced since show time has been prominently mentioned in motor car advertising.

G. E. HAS TRAVELING ADVERTISEMENT

THIS motor truck body was designed by International Harvester for the delivery of General Electric refrigerators. It very aptly illustrates the wonderful advertising possibilities of an attractively and distinctively finished modern automotive delivery unit.

The features of the General Electric refrigerator, including the monitor on top and the all-white lacquer finish, are faithfully utilized in the design of the cab, and, as a result, the motor truck possesses remarkable attention-getting value as it travels here and there on its daily round of deliveries. In fact, by means of this veritable traveling billboard or outdoor showroom, the G. E. advertising message may be shown almost anywhere, even in exclusive residential sections where no other kind of outdoor display advertising is permissible.

Even the hinges and locks on the cab doors, the refrigerator name plates, and the legs below the cab doors, as shown in the illustration, are the same as those on the G. E. refrigerator and with the monitor are supplied by the General Electric Company from regular stock parts. Standard refrigerator hinges and locks are also on the rear doors. The body is



also finished in white lacquer, and on each side is a simple inset panel, 11 feet 8½ inches by 3 feet 8½ inches in size, which is bounded by blue striping and has a frosted light in each corner.

The standard G. E. monogram, of course, is in blue and gold. This monogram is reproduced on each panel as shown and on each rear door. Besides the stop light at the rear, there is a red courtesy light in each upper corner of the rear end. Chromium-plated bumpers and a chromium-plated steel channel rail entirely around the body give a pleasing finishing touch to this very attractive-looking motor truck.

The inside height of the body at the sides is 5 feet 6 inches and at the center under the bows 6 feet, while the inside length is 13 feet and the width between padded rails is 7 feet. The body is of aluminum and is shown mounted on an International Model A-4, 2-ton, six-cylinder speed chassis of 170-inch wheelbase.

How to Service the Startix

By Winchell A. Royce

The Factory Offers Some Authentic Service Information Covering This Device Found on Many 1932 Cars

WITH Startix, newest product of the Bendix Aviation Corporation, being adopted as standard equipment by various automobile manufacturers and an enormous number being sold to individual car owners, engineers, technical service men and automotive mechanics will be interested in having complete knowledge of the mechanism of the device and its method of installation.

Startix is an automatic switch which operates the starting motor of any automobile, bus, truck or marine engine equipped with the Bendix starter drive. It ends all necessity of using the conventional starter button on the floor, dash or steering post. When the ignition key is turned to the "on" position, Startix instantly and automatically operates the starting motor. If the engine stalls at any time while the ignition is on, Startix automatically re-starts the engine without thought or effort on the part of the driver.

For the majority of installations it is possible to mount Startix without any change in existing electrical units by simply changing a few wires, removing or adjusting the existing starter switch and mounting the Startix box on the dash underneath the hood. One model of Startix is applicable to all installations.

The wiring diagram shown in Fig. A indicates the correct method of connecting Startix to the various electrical units of cars using the ordinary type of ignition switch.

Connections to the starting motor, generator and battery follow the same general principles on all cars; only the connections to the ignition switch require special treatment.

The principle for ignition switch connection on cars using any "B" type Electrolock, Shaler switch, or Clum Switch is shown in Fig. B.

For cars using a combination lock coil and ignition switch, Fig. C shows the method of connection.

It might be noted that several makes of cars use an Electrolock or lock coil which does not have a third terminal, such as the one used for connecting an electric gas gauge, heat indicator and other accessories. Before Startix can be installed on these cars it is necessary to change either the Electrolock or lock coil to a type having the extra terminal.

Before mounting or adjusting Startix, the starting motor, generator, relay and battery should be checked as to clean commutator surfaces, proper brush contacts, uniformity of charging rate, correct performance of the relay, clean binding posts and tight connections.

The Startix box should be mounted as close to the starting motor as possible with the ignition and generator terminals in an upright position.

It is recommended by the factory that 14 gauge flexible wire with waterproof insulation be used for the Startix connections to the ground, generator and ignition switch (1, 3 and 4 in Fig. A). Standard No. 1 or No. 0 gauge cable should be used for the battery and starting motor connections (2 and 5 in Fig. A). Cable to the starting motor should be bent or flexed slightly to pre-

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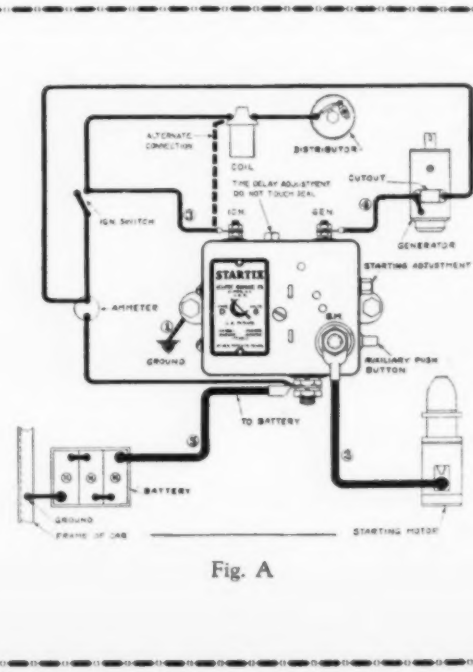


Fig. A

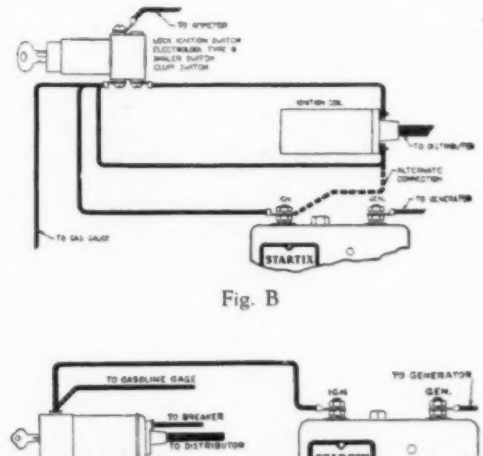


Fig. B

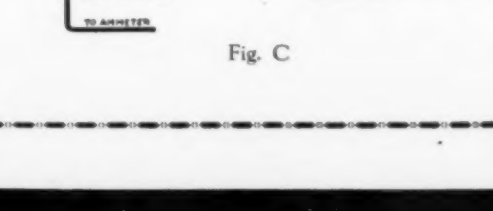


Fig. C

1932 STARTIX SERVICING (*Continued*)

vent starting motor vibrations being transferred to the Startix mechanism.

Because of varying characteristics of generators and starting motors, it may be found necessary to reset the starting adjustment on the end of the Startix box (see Fig. A). Complete instructions for such adjustment are packed with each Startix. No change should ever be made in the time delay adjustment on top of the Startix box because it is properly set and sealed at the factory.

The auxiliary starter button on the end of the Startix box directly below the starting adjustment screw is intended for use when cranking with the ignition key at its "off" position while setting tappets or making other engine adjustments. It operates by a firm pressure of the finger and quick release.

FIG. 1

The operating principle of Startix is based on two solenoids (electro-magnets) with movable plungers. One is termed the main switch solenoid (A in Fig. 2) which has one set of coil windings. The other is designated the relay solenoid (E in Fig. 3) which has two sets of coil windings—inner and outer.

When the ignition key is turned to the "on" position, electric current from the battery passes through the main switch solenoid (A) with the circuit being completed through two tungsten points one of which is assembled in a vibrating arm assembly (B in Fig. 2) and the other mounted to a stationary arm which is grounded.

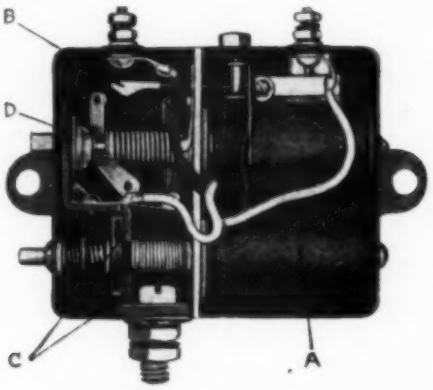


FIG. 2

The current through the main switch solenoid pulls its plunger in, making switch contact at C, Fig. 2. This allows current to flow from the battery through the main switch (C) and a large one-half turn series coil (D in Fig. 2) to the starting motor, whereupon the Bendix drive pinion automatically meshes with the flywheel and cranks the engine until it starts.

When the engine starts, the Bendix pinion is automatically disengaged from the flywheel. The current passing through the series coil (D) is decreased and its effect on the plunger of the relay solenoid (E) is overbalanced by the outer starting motor circuit winding (F in Fig. 3) on the relay coil. This pulls in the relay solenoid plunger. The inward travel of this plunger pulls the lever (G) over until it contacts and deflects the vibrating arm assembly. This results in the tungsten points being separated, interrupting the circuit through the main switch solenoid (A), thus breaking the starting motor circuit.

Also, when the engine starts, current from the generator energizes the inner windings of the relay solenoid (E) and holds its plunger in as shown in Fig. 3 as long as the engine is running. Incidentally, the current draw of this solenoid has practically no effect on the battery or charging rate, the maximum draw being only one-half ampere.

If the engine stops at any time while the ignition is "on," the relay solenoid plunger is released, which in turn releases the lever (G) and vibrating arm (B). The main switch solenoid circuit is again closed as in Fig. 2 and the starting cycle is automatically repeated. Regardless of the number of times the engine stops, Startix automatically re-starts it as long as the ignition is "on."

Startix incorporates a unique and most important feature in restarting the engine. Just the correct amount of time interval is automatically allowed between the stopping of the engine and reclosing of the starting switch so the starting motor and engine can come to a complete rest before re-cranking begins. This time interval is controlled by the vibrating arm assembly (B). Hence, re-starting is accomplished in a minimum of time and with complete assurance of protection to the starter system.

Another Startix safety feature is a thermostatic control which protects the starter system in event the Bendix pinion should stick in the flywheel teeth with the ignition unintentionally left on. This thermostatic device automatically opens the starting motor circuit momentarily under such conditions after about a half to one minute. From then until the ignition is turned off, the circuit is repeatedly opened and closed and warns the driver by a distinctive clicking sound that the ignition should be turned off.

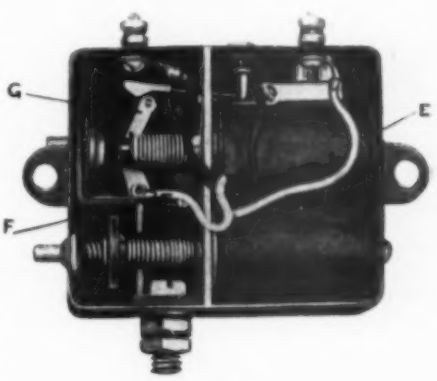


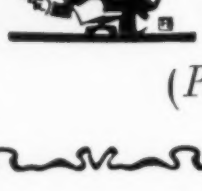
FIG. 3

Startix is a development of several years experimental research by the Eclipse Machine Company, Bendix Aviation Corporation subsidiary and manufacturers of the Bendix drive. It has been approved by the Underwriters Laboratories following the manufacturer's own extensive tests of its safety and convenience features. It is furnished with either a black crystalline or cadmium plated finish.

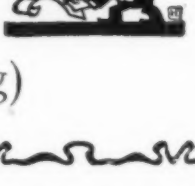
Replace Thin Brake Drums

IT is quite as important to replace brake drums that are worn thin as it is to replace brake lining that has worn beyond its usefulness. A good brake lining contacting a worn-out brake drum will cause brake drum distortion, as well as noisy brakes in some instances.

When a drum is distorted out of a true round it can no longer give proper braking. The lining that is used, whether new or old, is only as efficient as the surface that it has to contact. To meet the requirements of today's traffic, a brake job must be done thoroughly.



READER SAY-SO



(Picked at Random from The Editor's Mail-Bag)

Call on Us at Any Time

"WE are very much interested in your publication and have read the article 'How to Cut Oil Costs'. We should like to have you mail us some oil reclaiming literature, as we are interested in this proposition. We would also like to know if there are any devices made to be used on Chevrolets in the way of silencing the valve tappet noises, thereby eliminating unnecessary clatter in the motors."—*A. A. Wolff, Clayton Supply Co., Clayton, Mo.*

(Editor's Note: Oil reclaiming literature is being sent under separate cover. For valve tappet silencers write to John C. Hoof Co., 162 N. Franklin St., Chicago. Call on us at any time for any information you want.)

From an Advertising Man

"I WANT to congratulate you upon the new size and make-up of FLEET OWNER. This is a decided improvement over the small size and far more convenient, from a reading and advertising standpoint."—*R. C. Freitag, Advertising Manager, Sterling Motor Truck Company, Milwaukee, Wis.*

Thanks for the Suggestion

"I WOULD suggest that Mr. G, of South Milwaukee, who is having trouble with the Sterling axle shafts breaking, look after the taper in the hub of the wheel. If it is not true and is worn on inside, it will put a strain on the small end of the axle shaft, and cause the trouble described on page 45 of the FLEET OWNER for March."—*L. S. B., care of Boysen Baking Co., Chicago, Ill.*

Good Physically and Mentally

"THE information which you furnished us relative to the manufacturers of line boring machines and portable cylinder grinders will be of value to us in the future purchase of equipment for our field repair shops.

"I am of the opinion that the physical as well as mental presentation of your publication, THE FLEET OWNER, is very good."—*L. J. Foley, Asst. Equipment Engineer, Department of Highways, Harrisburg, Pa.*

We Helped Him Fix His Gauge

"I HAVE received through your Trouble Department, a service and repair sheet on the K-S Telegage, and on applying the instructions it gave, have been able to repair my gauge, which is now operating o. k. Thanking you for your kindness, I am"—*Diana Sa. Rua Presidente Pedreira, Nictheroy—E. do. Rio, Brazil, South America.*

He's Favorably Impressed

"THE first issue of FLEET OWNER in its new standard magazine size has arrived. The improvements and refinements are good, with its different format and make-up. I cannot resist telling you of the favorable impression that has been made. May you continue to progress."—*C. V. Hahn, Associate Professor of Mechanical Engineering, The Drexel Institute, Philadelphia, Pa.*

Do We Hear a Second?

"WE operate quite a large fleet of tractors and trucks. We read the FLEET OWNER with much interest, but why not give us some dope on tractors? Would appreciate a complimentary copy of the Shop Chart mentioned in your March issue."—*W. T. Coleman, Supt. of Highways, Roane County, Spencer, W. Va.*

Cops Want Battery Charts

"PLEASE forward to us a few copies of your 'Battery Testing Chart' as referred to on page 55 of the December issue of THE FLEET OWNER. These are to be used in the School of the Motor Transport Maintenance Division."—*J. F. Donnelly, Acting Captain, Motor Transport Division, Police Department, City of New York.*

No Foolin'—It's Mighty Helpful

"I HAVE been getting FLEET OWNER for some time and want to express my appreciation. The tips found in your publication have helped us save time and money and have also added to the efficiency of doing our work. FLEET OWNER will always be welcomed by us because of its fine help in our shop."—*Jean Babin, Garage Foreman, Hill Bread Co., Newark, N. J.*

"Sure is Big Improvement"

"THE March issue of FLEET OWNER has been received and it sure is a big improvement over the previous copies, as it gives more space for illustrations, etc. I also like to read the Trouble Shooter pages as this department often gives some good pointers."—*Albert W. Sharp, Garage Foreman, Suburban Laundry, Philadelphia, Pa., operating a fleet of 49 trucks and 9 passenger cars.*

Try This on Your Sterling

"IN regard to the inquiry on page 45 of the March FLEET OWNER on breaking Sterling truck axles, I wish to say that we had the same experience with a 1½-ton G.M.C. Truck. After breaking several axles, we found that the wheel did not fit tightly on the tapered axle. The reason for this was that the nut was not drawn tight, causing wear between hub and axle. After replacing with both new hub and axle and keeping the nuts drawn tight at all times, we had no more trouble. I hope this will be of some benefit to the other fleet man who inquired about it."—*W. W. Deppe, Deppe Lumber & Produce Co., Baraboo, Wis.*

Manufacturers, Get Busy!

"I READ your publication with a lot of interest; it is of great help to us. It was through your magazine that the County became interested in and bought an oil reclaimer.

"In the Fall of this year the County will be interested in a reboring tool, cylinder sleeves, (possibly those made of alloy metals), and alloy valve seat renewal rings. I will appreciate any information or data on these subjects that you are able to give me. Please send me one of your Shop Charts for fitting pistons, rings, bearings, etc."—*R. C. Hill, County Engineer, Georgetown, Delaware.*

Your Suggestion is Appreciated

"I WISH to try to answer your question 'Who knows of a Rev-Counter?' which appeared on page 53 of your January issue.

"If F. C. H.'s truck has an engine such as a Buda, Waukesha, etc., these are built for both magneto and distributor ignition, and inasmuch as he has an Eiseman magneto installed, a distributor could also be installed for the purpose of mounting a 'Rev-Meter' such as he has inquired about.

"Our nine Hug trucks have no speedometers, but we installed governors, and to set and check these governors, we took an old distributor shaft and gear and made a mounting to receive a speedometer head. This head was calibrated to read R. P. M. I might add that the Hug has a Buda engine with magneto ignition.

"We simply pulled the plug in the distributor mounting hole, dropped our home-made tachometer in place and read the R. P. M. of the instrument, multiplied by two, and set the governor.

"In this way we can set the governor in a few moments, whereas before we drove the truck on the streets alongside a car driven by another person, then stopping to set the governor and trying again, which was quite an expensive procedure."—*A. J. Hauser, c/o Berem & Son, Bloomington, Ill., operating a fleet of 18 trucks and 6 passenger cars.*

TROUBLE SHOOTER

(You Ask 'Em — We Answer 'Em)

A department, devoted to correspondence from readers of FLEET OWNER. Any questions having to do with automotive service will be answered in this department. All properly signed inquiries will be replied to by mail and such of them as are believed to be of possible interest to other readers will be published in these columns.

Use "Strong-Arm" Methods

Question: We are unable to remove one of the rear wheels on a Model A Ford. We have used wheel puller and tapped hub and screwed in the bolt so much that the threads on the axle shaft were compressed so that we could not get the nut back on. Have you any suggestions?—C. L., St. Louis, Mo.

Answer: We note what you have done in this connection and would suggest that you use some "strong-arm" methods. Have you tried heating the outside of the wheel hub with a blow torch? This will cause the hub to expand on the taper and a few blows on the wheel puller will probably succeed in loosening it.

We would also suggest that you try using one of the "knock-off" wheel pullers. This is, as you are probably aware, a sort of heavy nut with a thread on the inside and a solid other end. Our suggestion is that you first put back the wheel and tire and remove the hub cap. Screw the "knock-off" puller on the axle shaft and jack up the *opposite* wheel, leaving the wheel that is to be removed resting on its tire on the ground.

Next take a heavy sledge hammer, the heavier the better, and pound the end of the "knock-off." This will give the effect of pushing the axle shaft out of the hub. Be sure that you do not jack up the wheel that is to be removed—it should rest on its tire, carrying the weight of the car until it has been "started." Then, after it is loose, it can be jacked up and easily taken off.

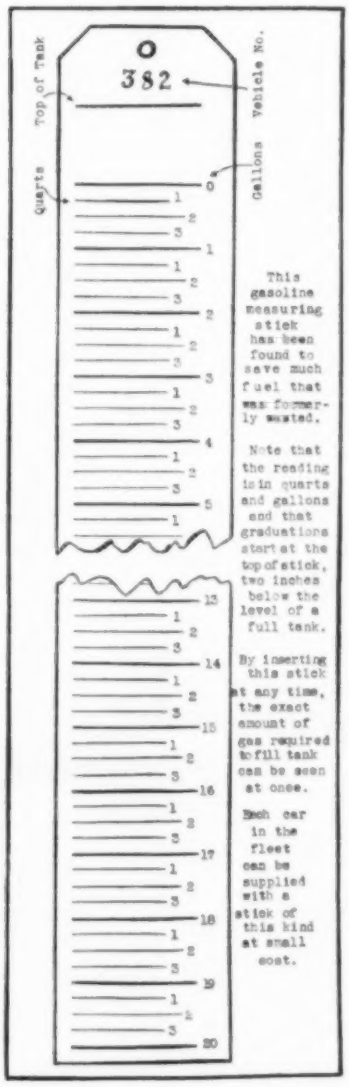
Who Knows of a Gas Gauge?

Question: The writer has been a reader of your publication for several years and would be glad to have you inform us if there is an accurate and dependable gasoline gauge on the market, and if so, where it may be purchased?

In the past, the gasoline gauge equipment on our fleet of busses has proved to be more or less troublesome, either by inaccuracy or complete failure. This has necessitated filling up the tanks until they overflow, thereby allowing a considerable amount of gasoline to be wasted. Anything you may have to offer us relative to correcting this condition will be appreciated.—A. E. D., Welch, W. Va.

Answer: We have just had an opportunity of contacting with several manufacturers of gasoline gauges and we find that it is practically impossible to install an electrical or hydrostatic gauge on equipment that was not originally designed for it. This is an engineering job, and unless your tank happens to be the same size and shape as the one for which the gauge was designed, you will not have much success. You did not state what kind of gauges you have already used; neither did you state the make of the busses, so it is hard to advise anything definite.

The illustration accompanying this article shows a type of "gasoline stick" that is being used by one fleet operator with very much success. The caption fully explains the proposition and this device


Top of Tank
382
Vehicle No.
Quarts
Gallons
This gasoline measuring stick has been found to save much fuel that was formerly wasted.
Note that the reading is in quarts and gallons and that graduations start at the top of stick, two inches below the level of a full tank.
By inserting this stick at any time, the exact amount of gas required to fill tank can be seen at once.
Each car in the fleet can be supplied with a stick of this kind at small cost.

certainly will prevent overfilling and consequent spillage. These can be made up, one for each truck, at practically no cost to you.

If you will write again, letting us know the make and model of your busses, together with the make and type of gas gauges now being used, we will endeavor to get some *real* information for you.

"High is Low" and "Low is High"

Question: We have a 1929 Ford with a broken rear-end. The old pinion gear has 9 teeth and the ring gear 34. The new set of gears has 37 and 9 teeth and this caused an argument. Which set of gears are the highest, and why?—H. R. G., Freedom, Ind.

Answer: The 34 to 9 ratio is the *lower gear ratio*, as this is 3.77 to 1 in ratio. However, it provides a *higher road speed* than the new set of gears, per engine revolution.

The new set with the 37 and 9 teeth, is the *higher ratio*, since it is 4.11 to 1. This higher ratio will give a *lower road speed*, per engine revolution, than the old gears.

When we speak of gear ratios, we do not speak of whether or not it gives a higher or lower road speed, but what the actual ratio of one gear to the other really is. The larger the ratio, the higher it is, but the lower the road speed will be. Strictly speaking, the 37-9 tooth job is a *higher* ratio than the 34-9.

Now that we have made this clear (?) to you, argue it out for yourselves, boys. Not being in your shop, we won't get hit by the stray punches, as a referee usually does.

No Special Oil Needed

THE rise or fall of temperatures which change the consistency of oils, has no effect on the operation of the L. G. S. free-wheeling unit, W. C. Starkey, president of the L. G. S. Devices Corporation, points out.

"Engineering tests made over a long period with L. G. S. free-wheeling units have proved conclusively that it is not necessary to constantly change to oils of different viscosities when different temperature changes are encountered. We have found that the best lubricant to use at all times in the unit is the one which gives the best results in the transmission.

"This is due to the construction of the L. G. S. free-wheeling unit which has only three major parts. Our engineers have found that when these units are frozen to 20 degrees below zero and any type of oil is used, they still operate. Although in colder temperatures most oils of any viscosity congeal, this congealing has no effect upon the operation of this unit.

"Hence we do not recommend that operators, whose cars are equipped with L. G. S. free-wheeling units change their oils in the unit with the rise and fall of the thermometer. Neither do we recommend the thinning of oil with a solvent and thus impairing the oil's efficiency. The lubricant that is best suited for the transmission in the winter or in the summer works equally well," he declared.

TROUBLE SHOOTERS' DEPARTMENT (*Continued*)

Burns Out Distributor Points

Question: We have a 1927 GMC 2-ton truck with a Buick Master Six Motor supplying the power. We have had excellent service most of the time the truck has been in use, but recently we have had considerable trouble with the points in the distributor burning out after about a week or ten days' service.

New coils and condensers have been tried out but the points still burn out and our maintenance mechanic is at a loss to know what to do to overcome this trouble.—H. & M. Co., Tacoma, Wash.

Answer: There is probably a poor ground connection somewhere between the condenser, distributor and the engine, that causes your points to burn out. If possible, try running a separate wire from the ground connection of the condenser to the engine block.

Another place to look is at the connections between the generator, ammeter and battery. Sometimes a loose connection in the charging circuit will burn out contact points, just as it will burn out lamp bulbs, because the generator sends out a high voltage which, by some defective connection, is not permitted to reach the battery.

We presume that you are using a good quality of contact points. If you are not certain of the quality, why not try changing the brand, although we cannot advise you as to any brand in particular. Should our readers have any further information on this difficulty, the Editor will be glad to pass your ideas along.

Right or Left-Hand Springs?

Question: Why is it that some valve springs have a right-hand spiral and some a left-hand spiral? Given two valve springs of exactly equal dimensions, save their spiral turns, what would be the result if one were substituted for the other? Would this substitution have any effect on the opening and closing of the valves, as the force of the cam would be transmitted in the opposite direction from the original valve spring?—F. J. N., Chicago, Ill.

Answer: There is no difference in valve spring performance with either right or left-hand winding. As a matter of fact, many spring manufacturers furnish right-hand springs in all cases, unless the customer specifies left-hand springs. This, because it is natural to wind right-hand springs on a lathe, and before the advent of coiling machines, left-hand springs were rarely used.

However, when springs are nested together, one spring will be right-hand wound and the other left-hand. This is to prevent the coils of the inner spring getting between the coils of the outer spring and *not* because one spring gives better action than the other.

The force of the cam is the same regardless of right-hand or left-hand wind. As the spring is attached to the valve by means of keys through the valve-stem, and actuated vertically by medium of tappet, there can be no difference in the action, regardless of which way they are wound.

Given two valve springs of exactly equal dimensions, except their spiral turns, we do not believe there will be any difference if one were to be substituted for the other.

How to Lubricate Brake Cables

IT is now possible to lubricate all types of Bendix cable and conduit controls with practically no effort at the same time the automobile, bus or truck is lubricated by the ordinary high pressure system.

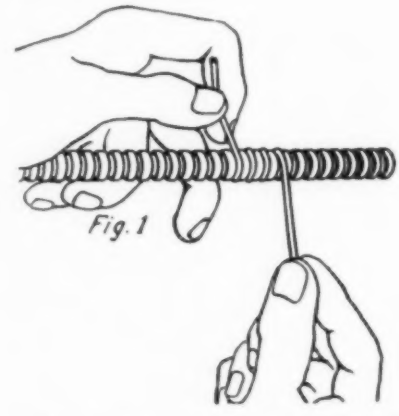


Fig. 1

The Bendix Brake Company subsidiary of the Bendix Aviation Corporation, has developed a fitting that can be installed on the non-lubricated type of Bendix conduits without removing the cables or disturbing their adjustment. Time required is about five minutes per cable.

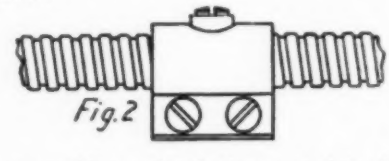


Fig. 2

A packing string is first wound in the groove around the conduit cover (Fig. 1). The halves of the fitting are placed around the packing string and clamped in place (Fig. 2). A hole is then bored through the conduit cover with a ⅛-inch drill, using care not to drill the cable. A pipe plug supplied with the fitting has a ⅛-inch hole in its center to provide a guide for drilling.

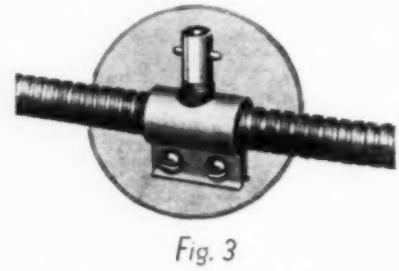


Fig. 3

After the Bendix fitting is clamped on the cable and the conduits drilled, the pipe plug is removed and an Alemite or Zerk fitting is screwed into its place. When completed the installation appears as in Fig. 3.

If Paint Gets in Your Eye—

MOST fleet garages do a considerable amount of lacquer painting. From a service bulletin comes the following item of interest: "Should you splash or spray some lacquer in your eye, follow this course: wash eye with pure amyl acetate, obtainable in any drug store; follow with a 15 to 20 per cent solution of boric acid. Then add two or three drops of pure castor oil."

How to Time the "Little Marmon"

Question: Will you kindly give me the correct valve timing for a 1927 Marmon Model L, or "Little Marmon."—E. H. K., Minneapolis, Minn.

Answer: Valve timing is as follows: Intake valve opens at six degrees, or .011" piston travel before top center. Breaker points of the ignition unit should be set to open at 19 degrees, or .109" piston travel, before top center with the spark lever in the advanced position. The points should open .020". Firing order is 1-6-2-5-8-3-7-4. Before attempting to check the valve timing, be sure that the valve tappet clearance is not more than .007".

Does It Run Better at Night?

THOUSANDS of operators have experienced the sensation of having their cars run better at night than during the day, and have wondered accordingly if the car really operated better or if it was only an hallucination. This question was put recently to Oldsmobile engineers and they inform us that improved car performance at night often is a fact and they explain the reasons why this is so.

"A noticeable improvement in car performance at night usually occurs when the day has been hot or sultry and there is a material drop in temperature at night," they explain. "This improvement is due to the change in atmospheric conditions.

"An internal combustion engine gives better performance when the gas mixture is under high compression—that is, providing the compression has not been raised to a point where detonation will occur. The denser, or more compressed, the gas charge is, the greater expansion it will have when it is fired.

"Air naturally becomes heavier and more dense when cold, expanding when hot. At 70 degrees temperature a pound of air will occupy 13.4 cubic feet of space, while at 32 degrees it will only occupy 12.4 cubic feet. Therefore, a larger and heavier charge of gas mixture can be drawn into an engine cylinder when the air is cool.

"Another contributing cause of improved engine performance at night is the fact that night air usually is damper than during the day, and the fine particles of moisture contained in it slightly slows the rate at which the fuel burns."

One Cause of Brake Drum Failure

"ONE cause of brake deterioration with which the average maintenance man is not familiar," says Vice-President J. B. Siegfried of Motor Wheel Corporation, "is the tendency of the comparatively soft brake lining to absorb metal from very much harder steel brake drums.

"One little steel particle starts the process. It may be loosened by a bit of grit; but, once dislodged and acting as a cutting tool, it attracts more steel, which in turn cuts still more steel, which does still more cutting—and the accumulation grows and grows.

"The important point, from the standpoint of safety and satisfaction, is that the area of the lining which is impregnated with steel contributes little or nothing to braking, and that the impregnation process, once started, is bound to go on and become worse, particularly with free-wheeling."

WHAT DO YOU READ?

HERE'S a hand-picked assortment of literature that is offered to you entirely without obligation.

We've even made it easy for you to get it. Fill in the coupon below, mail to the Editor, and let us do the work. We'll ask them to send it at once and not to bother you with salesmen, either.

1. How to Cut Oil Costs. Literature that tells you how you can save real money by reclaiming crankcase drainage. Tells how much it costs per gallon to reclaim your oil; what the machine costs; how it works. Also tells what other operators are doing along these lines.

2. The International Trail. A distinctively well-written and interesting monthly magazine issued by a leading truck maker. Besides listing new models, it contains many well illustrated stories that relate the experiences of other operators with trucks, in many different lines of business.

3. The Inside Story of Ethyl Gasoline. A well gotten up booklet that answers any questions you might have in mind about Ethyl Gasoline. It's written in plain English, with all the high-hat, engineering terms left out, and, believe us, it's mighty interesting.

4. New Brakes for Old Trailers. A set of data sheets and engineering bulletins describing power brakes and trailer axles and telling how you can comply with the law regarding brakes for trailers, without scrapping your present equipment. More than five large companies had a hand in preparing this, so it must be good.

5. The Four Airmen. Meaning four air appliances for better tire service. This literature describes a four-point air service that insures proper inflation, instant reading of pressures and positive seal of air in tires. Tells how to get more mileage out of your tires, too.

6. Sponge-Rubber Seats for Your Drivers. This literature illustrates and describes a new type of truck or bus driver's seat that can't wear out, is always fresh and resilient and gives the driver a sense of security and firmness in driving. We'll say it's worth investigating.

7. Be a Transportation Expert. Learn more about tires for all types of heavy-duty vehicles. Get this especially prepared booklet of bus and truck tire facts, issued by one of America's leading tire manufacturers. It also contains the latest dope on balloon tires for trucks and busses; also puncture-proof tubes.

8. Modern Trailers and Semi-Trailers. This set of literature covering trailers for all types of hauling needs is offered by one of our largest trailer manufacturers. It illustrates and describes such features as fifth wheels, rounded front ends, automatic couplers, brakes and axles. Well worth asking for.

9. Save Money on Ignition Cables. This literature describes a new tool for attaching terminals to high tension wiring, giving a factory-finished job, with an inexpensive hand tool. By carrying a few spools of wire and a small box of terminals, you can become a cable "expert" with very little practice. There's a new distributor terminal shown in this literature, too.

10. Get a Sample of This. A generous-sized piece of good sheet packing that you can use on your next job will be sent. All you have to do is enter "No. 10" on the bottom of this blank and mail to the Editor. It's free, of course.

11. No More Cocked Valve Springs. This literature describes a new idea in valve spring tension equalizers that will put your valve troubles to an end, unless we've missed our guess. It also gives the dope on flat-seat valves, about which everybody is talking.

12. Does the Pump Leak? A new type of water-pump that is absolutely "Pack-Less" and can be installed on any of the popular makes of cars and trucks. This is something that we've been looking for since "they fought with spears." A Cleveland firm announces it, and their literature is offered free.

13. Guaranteed Spark Plug. "Thirteen" might be an unlucky number, but if you are having spark plug troubles, why not try to change your luck? The man who issues this plug literature (and sells you the plugs) will let you be the judge as to whether or not he has a better plug. Of course we'll see that you get the literature, if you want it.

14. Stops Like Lightning. We don't know how fast that is, but imagine it must be p.d.q. That's how fast your trailers, heavy trucks or busses will stop, says the maker, if you install his new electrically-controlled brake booster. Ask him to prove it by sending literature, without obligating you.

15. Pay Cash and Pay Less. That's good advice, provided you can scrape up enough of the necessary wherewithal. At any rate here's a truck manufacturer who offers a liberal discount to fleet buyers and invites you to write for his proposition. We don't know anything more about it, but will be glad to dare him to prove it to you.

16. More Saving on Wires. We've told you about saving money by making ignition cable outfits for your engines (see No. 9) but we forgot to mention that you should use quality cables. We'll let this manufacturer do it, in his especially prepared Ignition Cable Bulletins describing a better grade of wire for oil splashers and other tough locations. Get them—they're free.

17. Build Your Own Bodies? If you do, you'll surely want literature and samples of new plywood with metal facing, for panels and other parts of the bodies. We've got dope sheets from two good manufacturers on our list; all you must do is mention "No. 17" and we'll bet on the nearest one to reach you first.

18. Wheel Alignment Specifications. We've been preaching wheel alignment for a long time, but now you can know that your wheels, axles and related parts are in their proper positions by referring to this "Wheel and Axle Manual." It gives the authentic factory specifications for toe-in, caster, camber, n'everything. Besides, it shows how your mechanics can become experts in this line. If you don't like it, send it back; but we're sure you'll keep it. Anyway, like everything else on this page—it's free.

The Editor, ... 1932
FLEET OWNER,
90 West St., New York, N. Y.

Kindly send me without obligation, the following free books mentioned in the ..... issue. Order by number.

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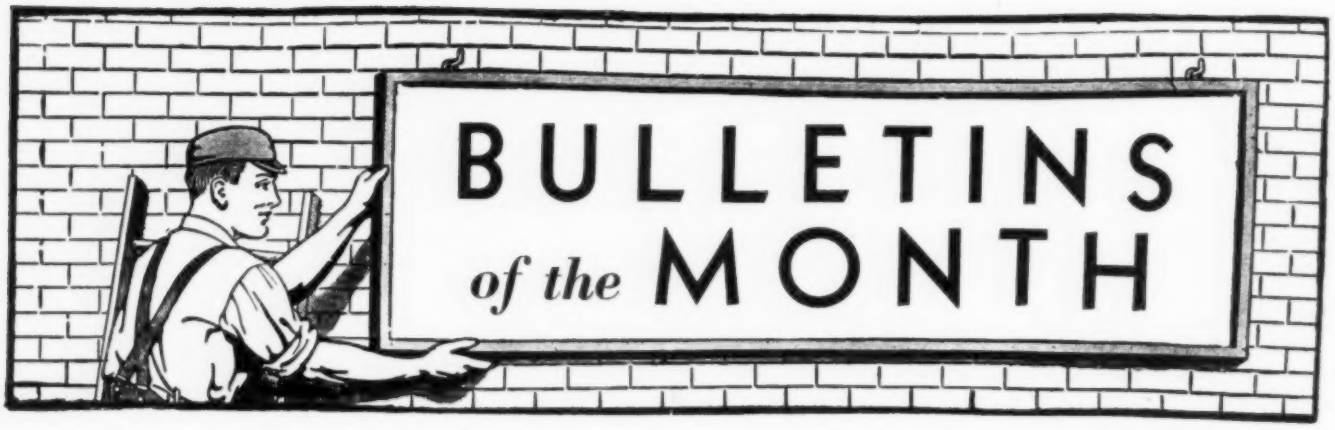


THE Third Joint Trade Show of the Motor and Equipment Manufacturers' Association and the National Standard Parts Association will be held in Detroit during the week of December 5, according to an announcement issued jointly by both associations.

ROY DAVEY, former advertising manager of United American Bosch Corp., Springfield, Mass., is now sales promotion manager, according to a recent announcement. He is assisted by Charles L. Shedd, formerly Chicago automotive division sales manager. Intensive sales activities of this Company are now under way.

CONFIRMATION of the purchase of the Accuralite Company, of Muskegon, Mich., by The Piston Ring Company of the same city, was made recently by C. E. Johnson, president of the latter company. The combination of these two important industrial enterprises is a logical one because of the relation of their respective products.

RETAIL deliveries of new Reo Speedwagons and trucks in 43 states comprising 85.64 per cent of the U. S. domestic truck market, according to registration figures available, are 34 per cent ahead of those for January, 1931. This is the seventh consecutive month that Reo's commercial sales have been ahead of the same month a year before, factory officials point out.

FOUNDED on the fact that suppliers are the first to secure contracts after a depression period, an early upturn in business is predicted by P. B. Batten, president of Twin Disc Clutch Company. The customer list of this company increased 31 per cent during 1931, according to Mr. Batten.

TRANSFER of H. L. White, from the managership of the Autocar branch in Pittsburgh, to Philadelphia, where he will assume charge of the sales in the "outside" territory of the Autocar Philadelphia district, is now announced. Mr. White succeeds A. M. Bates, who is transferred to the National Accounts division in New York.

THE U. S. Post Office Department recently placed an order through the Washington Branch of the Ford Motor Company for 2,000 Ford truck chasses, 500 with a gross load carrying capacity of 1,800 lbs. and 1,500 with a gross load carrying capacity of 4,200 lbs., according to report just received. They will be delivered to post office garages in various cities.

A NEW type of roller-chain, for chain-drive trucks, tractors and motorcycles is announced by Morse Chain Company, Detroit, Mich. The new joint construction consists of two members within the roller—a segmental bushing and a pin, which are claimed to facilitate lubrication, give more uniform wear and smoother, quieter operation. Write to the manufacturer for details, if interested.

SPICER Manufacturing Corporation of Toledo, Ohio, has recently taken on the manufacture and sale of the "Power-flo" Self-Operating Clutch under license from Automatic Drive & Transmission Co., Inc., of Gloucester, N. J. It is understood that the arrangement gives to Spicer exclusive rights to the manufacture of this product within the commercial vehicle field only.

SHIPMENTS of Federal trucks in February showed a 225 per cent increase over January, according to Henry Krohn, vice-president in charge of sales of the Federal Motor Truck Co., Detroit, Mich.

COMPETING with 23 racing cars of all nations, a Studebaker truck took 12th place in the Grand Prix of Sweden on February 28th, according to the Studebaker Corporation. The truck was entered by its owner, a fish merchant, and covered the 230-mile course at an average speed of 45 miles per hour. The truck had previously been driven over 30,000 miles, carrying fish.

A SHARP upturn in sales, accompanied by many inquiries from all parts of the country, have followed the recent introduction of new, low-priced truck models by the Diamond T Motor Car Company, according to announcement by C. A. Tilt, president.

A GAIN of 81 per cent was registered by the Chevrolet Motor Company during January in fleet deliveries—cars and trucks sold for commercial purposes—over the same month last year, according to a factory report. Nearly fifty large companies were numbered among those who purchased new equipment during the month, three different organizations taking delivery of 100 or more units each.

ALL new school busses purchased in California must have non-shatterable or safety glass, says a report received from the Board of Education of that state, effective March 1st. The ruling further provides that all other school busses equipped with ordinary glass will have to be changed over to safety glass by July 1st.

ANNOUNCEMENT has been received from Homestead Valve Mfg. Co., Coraopolis, Pa., of the appointment of Shaw-Palmer-Bakewell Co., 409 E. 3rd St., Los Angeles, Calif., as sales representative for their "Highpressure Jenny" in the Los Angeles district. "Jenny" is a machine used for cleaning floors, windows, machinery and automotive equipment.

GUY H. BILLINGS, who has been with the FWD Auto Co., Clintonville, Wis., for 19 years, has recently been appointed assistant general manager. He will also retain the duties of purchasing agent in his new position.

AN elaborate booklet entitled "International Speed Trucks" has just been brought out. It illustrates and describes the line of 1932 International Trucks. For free copy address International Harvester Company, 606 S. Michigan Ave., Chicago, Ill. The Editor will get you a copy, if you prefer.

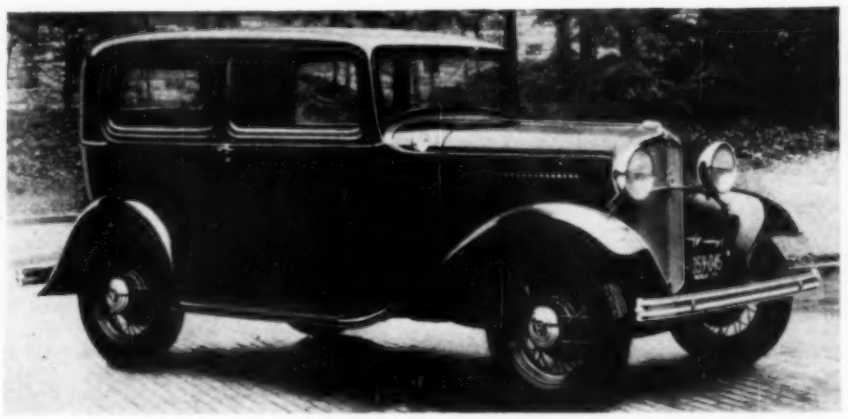
THE cooling system of the new Dodge G-80 heavy-duty trucks is protected from iron rust and made more effective by the use of an expensive soluble oil that is mixed in a definite proportion with the cooling water. Because of its emulsive properties, the oil coats the inside of the cylinder block and prevents further rusting, Dodge engineers point out.

SALES of Studebaker passenger cars and trucks exceeded 5,000 units in February, according to A. R. Erskine, President. This is 68 per cent in excess of January 1932 and 13 per cent in excess of February 1931. The figures do not include Rockne or Pierce-Arrow sales.

TICKETS of the Erie Railroad now include taxicab transportation from the Erie terminal in Jersey City to points in New York City, making it possible to complete a railroad journey into New York, and arrive at your exact destination, on the one railroad ticket. A slight per capita charge is made. The arrangement is made possible through cooperation with the Parmellee Taxicab System. The scheme works in the opposite way, as well.

ADVERTISEMENT: Maintenance and Service Executive, available for immediate service. Age 42; twenty-five years' experience, practical and technical: proven ability. Captain, Maintenance Officer, U. S. Army Motor Transport Service for 12 years. Preference, New York Metropolitan area. Address Box WHM, Fleet Owner, 90 West Street, New York City.

FORD PASSENGER CARS ANNOUNCED



THE new Ford V-8 passenger car was shown to the public on March 31st. The following brief specifications were available as this issue went to press:

The car is longer, larger and roomier. Its V-8 engine develops 65 brake h.p. at 3,400 r.p.m. Bore and stroke are 3-1/16 x 3¼ inches and S. A. E. rating is 30 h.p. The engine is of the 90-degree type, with cylinders and crankcase cast in one unit.

The new car embodies a number of outstanding features, including a silent synchronized gear-shift, rubber-mounted engine, down-draft carburetor, intake silencer, automatic spark control, diaphragm-type fuel pump, and gasoline tank in the rear.

Suspension is by flexible transverse cantilever springs, with a newly-designed rear spring. Other features include self-adjusting Houdaille double-acting hydraulic shock absorbers, larger four-wheel brakes, newly-designed steel-spoke wheels, larger hub-caps and larger tires.

Additional engine details include: counter-weighted crankshaft, statically and dynamically balanced, with four cranks at right angles to each other. Pistons are of aluminum alloy and have two compression and one oil ring. New type valves, with mushroom ends, operate from a single camshaft. The connecting rods from opposite pistons are placed side by side on each crankshaft throw. These are mounted on new "floating" steel bushings, babbitted inside and out, which serves to give the benefit of the full crank-pin bearing area to each connecting rod, affording longer wear.

The cast aluminum cover, embracing the intake manifold, forms the top of the engine; both down-draft carburetor and fuel pump are mounted on this cover. Exhaust ports are on the outside of the engine blocks, the left exhaust pipe being carried around the front of the engine. Distributor operates directly from the front end of the camshaft, without the use of gears. Crankshaft and crankpin bearings are lubricated by pressure, as are the main bearings of the camshaft. Pistons and valves are oiled by spray and splash.

Fourteen body types of modern, streamline design are offered. The Ford Four, with a 4-cylinder engine developing 50 h.p. and capable of 65 m.p.h. can also be supplied on virtually the same chassis and bodies. Except for the engine, there is little difference between the two cars.

Additional details, and mechanical photographs of the new Ford cars (and probably trucks) will appear in our next issue.

THREE INTERESTING NEW PRODUCTS

Carburetor Parts Cabinet

A SECTIONAL cabinet to hold every part required to service all types of Stromberg carburetors has been designed and offered by the Bendix Stromberg Carburetor Company, a subsidiary of the Bendix Aviation Corporation, South Bend, Ind.

Built of steel with compartments scientifically laid out and identified, the cabinet is designed to serve as a permanent parts bin and is expected to fill an acute need of service shops.

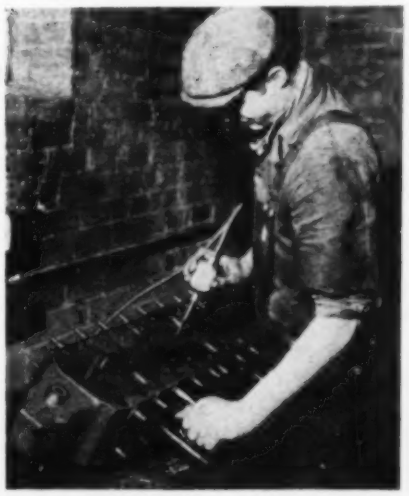
The cabinet is being supplied at present in two units, each consisting of three drawers. This contains parts for servicing all the popular types of Stromberg carburetors. The second unit has one drawer and attaches to the top of the first by an ingenious spring clip. This has compartments similar to Unit No. 1, and, with the three drawers in the two units completely filled, the service shop using them is prepared to service the particular type Stromberg carburetor used on the cars serviced by them. The cabinet can be built up with additional units as the need arises.

Air-Operated Valve Grinder

A NEW air-operated valve grinder is now being produced by Cleveland Pneumatic Tool Company, of Cleveland, Ohio, makers of pneumatic tools, appliances and accessories.

Among the advantages of this new "Cleco" light-weight, low-priced grinder are its size and shape; its speed, which reduces grinding time; freedom from vibration and freedom from adjustment or attention.

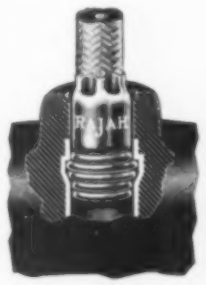
The grinder's oscillating movements provide alternate one-eighth turns on the face of the valve seat, eliminating the possibility of grooves and assuring equal grinding for the entire circumference, according to the makers. It is equipped with adapters to engage slotted, drilled or plain-surfaced valve heads.



It is automatic in action when pressure is applied by the operator and the speed is increased or diminished according to the pressure applied, automatically stopping when lifted off the valve. It will operate off any 3/8th-inch air line. Write to the makers, or to the Editor, for literature and prices.

This Terminal Will Stay Put

THIS new type of distributor terminal has been developed to overcome the disadvantages of the ordinary terminal. It is guaranteed to "stay put" and will not jump out of the distributor cap socket, according to The Rajah Company, Bloomfield, N. J., who have recently placed it on the market.



The new Rajah Universal Distributor Terminal will fit all types of ignition distributors and is made of an ingenious brass spring, attached to a regular Rajah ferrule.

Easy attachment to cables is permanently made by using the Rajah Hand Crimping Tool, illustrated and described in our March issue.

Readers are invited to write for free samples of this terminal, addressing either the Editor, or the Rajah Company, Bloomfield, N. J. You'll mention this publication, won't you?

WHITE HANDLES NEW INDIANA TRUCKS

A NEW series of six-cylinder trucks, to be sold and serviced through the factory branch and dealer organization of The White Company, is announced by the Indiana Motors Corporation, of Marion, Indiana. These new Indiana trucks, to be known as the model 95 series, will be available in 12,000, 15,000, and 20,000 gross weight capacities.

Model 95 has a single-reduction rear axle, and is designed for a load of 12,000 pounds and high speed service. The model 95-DR has a double-reduction rear axle and is designed for loads of 15,000 pounds where greater power is needed, and is recommended for tractor service or dump work with a 2 yard body, and larger stake body. The models 95SBT-150 and 95SW-75 are 6-wheel units designed for 20,000 pounds gross. In all models the power axles are full floating.

Five wheelbases are available on the models 95 and 95-DR, namely, 132 in., 141 in., 155 in., 169 in. and 186 in. Two wheelbases are available on the models 95SBT-150 and 95SW-75, namely, 168 in. and 186 in.

The 6-cylinder engine is of the L-head type with a bore of 3¾ in., stroke 4¼ in., giving a piston displacement of 282 cubic inches. Cylinders and crankcase are cast-in-block.

Large frame section gives the chassis adequate capacity for rated gross weights Hydraulic four-wheel brakes and heavy duty cam-and-lever steering gear assure positive control of the trucks under all driving conditions.

These new models are now being supplied to all branches and dealers of the White Company which will merchandise the Indiana 95 series along with the regular complete line of high grade trucks and motor coaches.

Standard equipment on all models includes the following: crown front fenders, running board with splash aprons, channel bumper, jack, set of tools, electric lighting and starting equipment, electric horn, oil gauge, heat indicator, ammeter, dash light, air cleaner, speedometer, rear vision mirror and spare wheel.

The cab (extra equipment) is Indiana DeLuxe, built in own plant. It has sedan doors with drop windows operated by strongly constructed crank mechanism, one piece windshield full ventilating, automatic windshield wiper, air cushions with double decked springs upholstered in imitation leather. Cab has clear vision and is exceptionally roomy. Weight 470 pounds.

The following equipment is available at extra cost: Helper springs, radius rods, spring draw bar, tow hooks, side mounted gas tanks, safety lights, cowl lights, reflectors, vacuum booster, vacuum booster trailer connections, governor, tire carrier, full length running boards, oil filter oil bath air cleaner, spring bar bumper, combination tail and stop light, and grease gun.

STUDEBAKER REDUCES PRICES ON 1½ TONNER

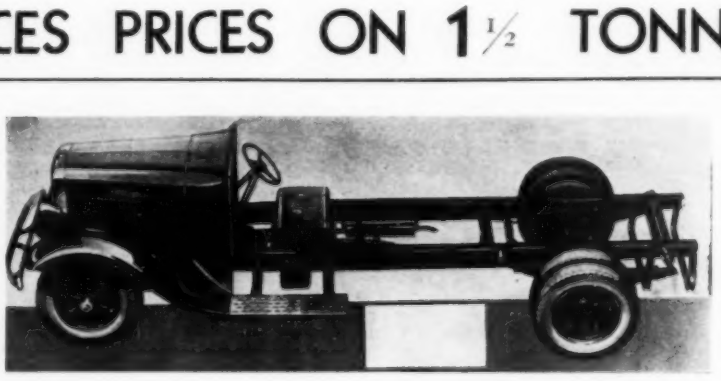
A REDUCED price of $670 on Studebaker 1½ ton trucks was announced April 1, by J. M. Cleary, President of S. P. A. Truck Corporation, South Bend, Ind.

Announcement was also made of a new 141 in. W.B. chassis added to the 1½ ton line. This makes three chasses available, at the following prices:

130 in. wheelbase, $670 at factory; 141 in. wheelbase, $695 at factory; 165 in. wheelbase, $745 at factory.

No changes in price are contemplated on the two and three ton Studebakers, listing at $895 and $1350, respectively. The new 1½-ton chassis, introduced last January, had its power increased from 70 to 75 horsepower, developing 35 h.p. at 1200 r.p.m.; 50 h.p. at 1760 r.p.m.; 60 h.p. at 2180 r.p.m., and 75 h.p. at 3500 r.p.m. This engine has a piston displacement of 230 cubic inches, and develops one horsepower for each 3.06 cubic inch displacement. The seventy-five pound crankshaft is both statically and dynamically balanced, and is provided with a vibration damper. The piston and connecting rod assemblies are balanced, the makers point out.

Studebaker also employs the newly developed electro-plated pistons. The plating, of soft metal, does several important things. It permits a closer fit, reduces possibility of scoring or the development of piston slap, and prolongs the life of the piston. After a 10,000 mile test with the throttle wide open, the piston fit was found to be closer than is normally allowed in a new engine with plain cast iron pistons, the engineers state.



Another feature is the new floating oil intake located in the crankcase, which allows only clean oil to enter the oil pump. It requires no attention. Dual fan belts give increased life to the individual belt and tend to prevent slippage. A high degree of heat dissipating efficiency is secured by the new, deep, flat tube radiator, and the large centrifugal water pump.

The engine, clutch, and transmission unit is secured to the frame by four heavy brackets. The front engine mountings are cushioned with large, live rubber blocks. Studebaker truck chasses are braced with cross members that fill the entire side member channel, and are secured with gusset plates. The propeller shafts, universal joints, and full floating rear axles are all of proper size, the factory emphasizes.

Brakes are of the Bendix duo-servo type, with two shoes, and cable control. These brakes employ forward motion of the vehicle to multiply the braking action. A B-K vacuum booster is standard equipment on the three ton, and is optional equipment at extra cost on the 1½ and two-ton chasses.

Within six months of the announcement of Studebaker 1½, 2 and 3-ton trucks in August, 1930, it arose from 18th to 6th place in the industry. Complete truck registrations for 1931 showed Studebaker with a 127 per cent increase, compared with a decline of 23 per cent for the industry as a whole, according to Studebaker officials.

APPOINTMENT of J. D. Burke as director of truck sales of Dodge Brothers Corporation to succeed Walter S. Graves who has been assigned to other duties, is announced by A. van-DerZee, general sales manager. Mr. Burke has been regional truck representative for Dodge in the New York territory for the past one and one-half years.

1½ - TONNER BY DIAMOND-T -- A SIX

ANNOUNCEMENT is made by the Diamond T Motor Car Company, Chicago, Ill., of a new 1½-ton, 6-cylinder model embodying heavy duty construction. The new addition to the Diamond T line, known as the model 210, lists at $595 for the standard chassis.

Three other models of 2-ton, 3-ton and 4-ton ratings, respectively, are also being presented at this time, the announcement continues, and they are likewise priced at low figures.

In addition to its mechanical features, the new 1½-tonner is marked by attractive streamline appearance, with black enamel radiator shell, fenders, running board and radiator apron, set off by a hood, cowl, wheels and cab finished in a rich shade of red. Style is further enhanced by a radiator guard of six chromium plated bars.

The six-cylinder truck engine of 3⅜ inches bore and 4¼ inches stroke is rated at 27.34 horsepower and actually develops 60 horsepower. It has a speed capacity of 50 to 60 miles per hour, a piston displacement of 228 cubic inches, seven main bearings with a total area of 85 square inches, heavy 2½ inch crankshaft, heavily reinforced cylinder block and upper crankcase cast in one

piece, force feed lubrication to main and connecting rod bearings, with all passages drilled in the block, cooling capacity for continuous high speed performance at full load, and many other features.

Other mechanical advancements include drop forged I-beam front axle designed to meet stresses produced by four-wheel brakes, full-floating rear axle with double Timken wheel bearings centered directly above the tires, and axle shafts relieved of carrying loads; latest type Lockheed internal expanding hydraulic brakes on all four wheels, 15 inches in diameter and 1¾ inches in width, automatically equalized and requiring no lubrication; single plate clutch; frame of maximum strength and rigidity; four-speed transmission in unit with the motor; cam and lever type steering, and leaf springs of generous dimensions with compression type rubber shackle bushings.

THREE TRUCK GROUPS IN WILLYS LINE

A NEW line of trucks and commercial vehicles is announced by Willys-Overland, with a variety of body types. The line is comprised of three groups—the Model C-113, ½ ton, with a wheelbase of 113 inches; Model C-131, 1½ ton, with 131 inch wheelbase and the Model C-157, 1½ ton, wheelbase of 157 inches.

This new line of trucks is equipped with the 65 horsepower, "Silver Streak" motor, and is presented in a wide selection of bodies, capacities and wheelbases to meet many requirements.

The 113-inch chassis is available from the factory in four styles, which include DeLuxe Cab Pick-Up, DeLuxe Sedan Panel; DeLuxe Canopy Express and DeLuxe Station Wagon. These bodies are notable for their streamlining, coachwork, finish and attention to detail.

The Model C-113 chassis has deep side rails with wide flanges and five cross members. It is equipped with semi-elliptic springs of chrome vanadium steel, self-adjusting Tryon shackles and double-acting hydraulic shock eliminators, front and rear. The four-wheel brakes are Bendix Duo-Servo, internal-expanding with cable hook-up and are fully enclosed.

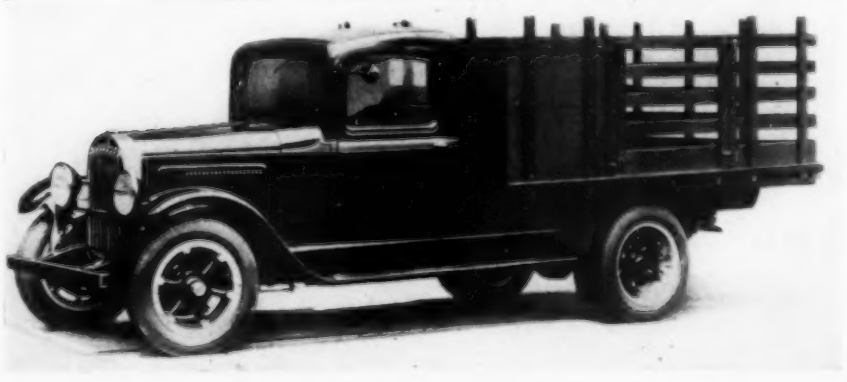
The 1½ ton models employ the bridge-type construction of frame and cross members, providing rigid support to both upper and lower flanges. These two chasses also have a wide selection of bodies to fit all agricultural and business needs.

In both the C-131 and C-157 models the rear axle is full-floating type, one of its features being that the axle shafts turn the wheels only, and do not carry the load weight. The shafts themselves are chrome nickel steel and may be removed without pulling the wheels. The housing is all-steel, banjo-type, with large inspection cover.

The 131 and 157-inch chasses employ heavy four-speed transmissions and are equipped with a convenient opening for quick installation of power take-off. The clutch is of the dry disc type with a ball throw-out bearing fitted for lubrication. Another interesting feature of the C-157 is the double-shaft type propeller with three universal joints, supported with a steady bearing mounted in the heavy cross member.

Brakes on these two models afford ample braking area. Wheels are heavy duty cast-type with demountable rims, offering the buyer a wide selection of tire and rim sizes. Dual wheels, including tires, are available at extra cost.

Production and shipment of these new units are well under way and the factory schedules call for ample volume to meet the anticipated demands from the field, the makers state.



Course in Ox-Welding

A COMPLETE course of instruction in Oxy-Acetylene Welding and Cutting is published in one massive volume by Stuart Plumley, Chief Engineer of Smith Welding Equipment Corp., Minneapolis, Minn. This book represents a lifetime of work and experience and is practically written so that every mechanic can understand it. Details on request.

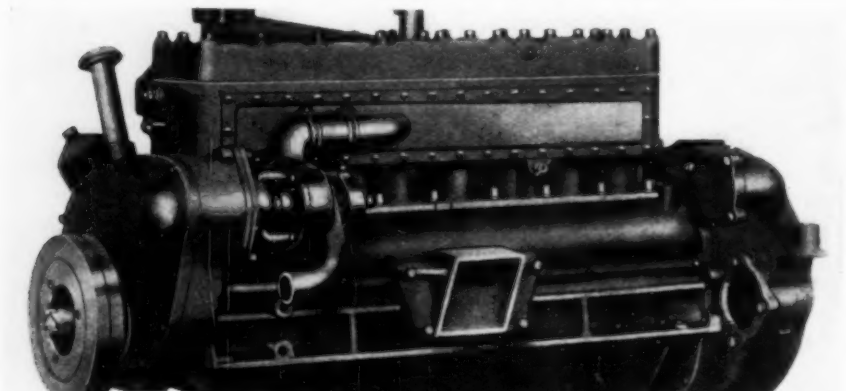
Thermoid Offers Fan Belts

A NEW line of fan belts for all installations has recently been announced by Thermoid Rubber Company, Trenton, N. J., makers of brake lining and other automotive products.

The new belts will be packaged in neat cartons and will be a quality product built for hard service, according to James A. Wheatly, Jr., Sales Manager of the Company.

Fleet operators are invited to write to Thermoid Rubber Company, Trenton, N. J., for free catalogs describing and pricing the entire Thermoid line of automotive products. The Editor will get these for you, if you prefer.

LYCOMING'S 8-IN-LINE TRUCK ENGINE



THE Lycoming new Model HF truck engine is of the L head, eight-in-line type. Bore is 3⅛ in. and stroke 4½ in., giving a piston displacement of 322 cubic inches. The horsepower rating is 105 at 2800 r.p.m., with maximum torque of 225 ft.-lbs. at 1200 r.p.m. The compression ratio is 5.25:1.

Cylinder block is detachable and of chromium iron with the addition of nickel. Large water passages are provided around all cylinder barrels and valves. Cylinder head is detachable with spark plugs and distributor mounting in head. Crankcase has longitudinal ribs running full length and cast above oil pan flange. This method of construction gives the rigidity necessary to withstand the torsion and twisting encountered in truck service.

The counterbalanced crankshaft, 2⅜ in. in diameter, is supported in five main bearings, of white metal alloy on bronze backs. Bearings are interchangeable without refitting or removal of crankshaft. All bearings are dowelled in caps. Crankshaft is fitted with vibration dampener. Camshaft is carried on six bearings, of white metal alloy on steel backs. Valve lifts are 11/32 in. Intake valves are of chrome steel with port diameter of 1-7/16 in. and valve seat angle of 30 degrees. Exhaust valves are of silchrome steel with port diameter of 1-5/16 in. and valve seat angle of 45 degrees.

The connecting rods are of No. 1035, SAE steel with I beam section. Length is 9 in. center to center of bearings. Lower bearings are of white metal alloy spun in rod. Piston pin is ⅞ in. diameter and is clamped in rod and floating in bronze bushings in piston. Pistons are of cast iron. Four rings are used, two ⅛ in. and one 3/16 in. are of compression type, with one 3/16 in. of oil regulator design. Camshaft and accessory shaft drive is through gears, 1½ in. wide with mating gears cast iron to steel. Teeth are angle cut.

Lubrication is by pressure to all main, connecting rod, front camshaft bearing and to front end gears. All oil passages are drilled through crankcase or rotating parts. Oil pump of gear type is located in crankcase and driven from camshaft by spiral gears. Suction end of pump is provided with removable screen. Cylinder walls, valve mechanism, piston pins and rear five camshaft bearings are lubricated by splash and spray. All oil from pump is carried through oil filter to main distributing passage cast in crankcase. Drilled passageways in crankcase webs carry oil under pressure to crankshaft and thence through holes drilled in crankshaft to rod bearings.

Cooling is by pump located on side of engine and driven from accessory shaft. The two stuffing boxes are accessible without special tools. Pump shaft is carried on two ball bearings. The front bearing obtains lubrication from the engine system and the rear bearing is provided with grease cup. Accessory gear shaft is carried on two bronze bushing in removable housing bolted to gear case, lubrication for bushing being obtained from engine system.

Intake manifold is of Swan type and provided with flange for 1¾ in. single barrel type carburetor. Intake riser is provided with stove fed from exhaust and controlled by manually operated heat valve on exhaust manifold. Flywheel housing is SAE No. 3 with provisions for SAE flange type outboard starting motor. The generator is of base mount type located behind pump and driven by accessory shaft through pump at crankshaft speed. A flexible coupling is used between generator and water pump. Distributor located on cylinder head is driven by spiral gears from camshaft. Fan is of four-blade type and driven by V belt from crankshaft. Fan assembly can be manually adjusted in vertical plane, 1-5/16 in. pad for fuel pump is provided on side of crankcase. Motor is mounted at three points, front support being of special design and recessed for rubber pad.

HAULING 'EM ALIVE WITH A TRAILER

THIS truck and trailer combination, a new development in the live stock trucking business, has a capacity of 40,000 lbs. of hogs and 32,000 lbs. of cattle.

The trailer is of special design, engineered by the Highway Trailer Company of Edgerton, Wis. It is a 3-CWV drop-frame semi-trailer, 88 inches wide and 24 feet long, equipped with helper springs, 38 x 7 dual pneumatics and with a stock rack body, 7 x 6 x 24 feet.

It has double doors at the rear, to swing against the sides. There is also a double deck and three cross gates.

This semi-trailer is equipped with a 5-DY Dolly and a standard, Martin, 24-inch fifth wheel.

As a normal load, Mr. Babel, of the Live Stock Trucking Company, carries 10,000 lbs. on the truck and the same on the trailer. Two hundred head of hogs are handled in the double decks of both outfits. In the two outfits, Mr. Babel also carries some 32,500 lbs. of cattle, or 30 head, in the two outfits.

If you are interested in obtaining literature on trailer applications of this and similar characters, it can be obtained entirely without obligation by writing directly to Highway Trailer Company, Edgerton, Wisconsin. You'll mention FLEET OWNER, won't you?

Morse Flexible Coupling

ONE of the newest products of the Morse Chain Company, 7601 Central Ave., Detroit, Mich., is a flexible coupling for driving such motor accessory units as water pumps, generators, etc. It is designed to compensate for parallel and angular misalignment in the mounting of such units and will be sold by the Company's automotive division, through automotive jobbers.

Transportation Engineer Available

AUTOMOTIVE Transportation Engineer, experienced in operating, maintenance and design of automotive equipment, available at reasonable salary to supervise or assist in operating motor fleet more efficiently. Recently state supervisor of gasoline bulk hauling. Member S.A.E. Location in South preferred. Will consider connection with reliable truck or truck equipment manufacturer. Address J. S. H., c/o Editor, FLEET OWNER, 90 West St., New York, N. Y.

TWO NEW SIXES IN DODGE TRUCK LINE

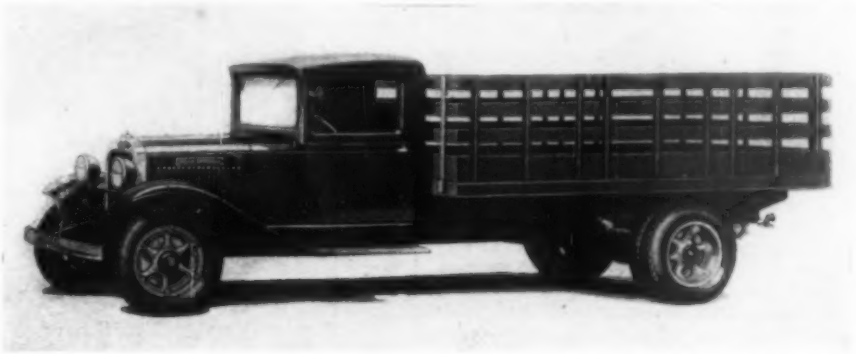
TWO new six-cylinder truck models, a 1½-ton and a 2-ton unit, are announced by Dodge Brothers. The 1½-ton unit, with a gross allowable weight of 8,200 pounds, is available in 131 and 157-inch wheelbase lengths. The 2-ton, with a gross allowable weight of 10,000 pounds is offered in 136 and 165-inch wheelbase lengths.

Both models are powered by engines of the L-head type with cylinders cast en bloc. Both have full force feed lubrication. The engine in the 1½-ton unit has a bore of 3¼ inches and stroke of 4¼ inches and develops a maximum of 60 horsepower at 3100 r.p.m. In the 2-ton power plant, the bore and stroke is 3¼ by 4⅜ inches and the maximum horsepower is 73 at 3200 r.p.m.

Full floating rear axles with spiral bevel gear drive, four-wheel, hydraulic, internal-expanding brakes with cast cylinder iron brake drums, a 10-inch, dry, single-plate clutch with ball bearing release and molded asbestos facing, and semi-elliptic alloy steel springs are used in both models.

Pistons are made of aluminum alloy, steel strutted. All main camshaft and connecting rod bearings are lubricated through riffle-drilled passages. Exhaust valve seat inserts are made of high-speed tool steel, fastened in place by roll-peening of the block. These inserts are claimed to eliminate the eroding of exhaust valves. It is said that these new inserts make possible upwards of 50,000 miles of faultless valve operation.

Oil-tight, centrifugally lubricated universal joints are used on both models. All baked enamel parts are bonderized to prevent rust. The frame of the 1½-ton 131-inch wheelbase model has a depth of 7 inches, flange width of 2-5/16 inches and thickness of 11/64 inches, while on the 157-inch wheelbase unit of this capacity, frame depth increases to 7-1/32 inches; flange to 2⅜ inches and thickness 15/64 inches. The frame is braced by six cross members, including the motor support.



The standard selective sliding gear transmission has four speeds forward and one reverse. Rear axle gear ratio is 5.857 to 1. Front springs are 36 inches long, 1¾ inches wide and have 8 leaves. Rear springs are 48 inches long, 2¼ inches wide with 12 leaves on all except the panel jobs, which have 8. The 61-pound, four-bearing crankshaft has four counterweights.

A five-speed transmission with silent fourth is one of the features of the new 2-ton model. The silent fourth permits driving continuously in this gear if desired, or if necessary. The five-speed transmission is said to improve performance and provides greater flexibility.

The frame of the 2-tonner has a maximum depth of 8 inches, width of flanges 2¾ inches and thickness of 11/64 inches. There are five cross members, including the motor support on the 136-inch wheelbase model and 7 on the 165-inch unit.

Rear axle gear ratio is 6.375 to 1. Front springs are 39 inches long, 2 inches wide and have 8 leaves. Rear springs are 48 inches long, 2½ inches wide and have 11 main leaves plus 5-leaf auxiliary springs. The statically and dynamically balanced crankshaft weighing 62.5 pounds, has four counterweights.

NEW FAST EIGHT OFFERED BY PIERCE

PIERCE-ARROW announces a new eight-cylinder truck chassis rated at 13,000 lbs. maximum gross weight, as an integral part of their 1932 truck program.

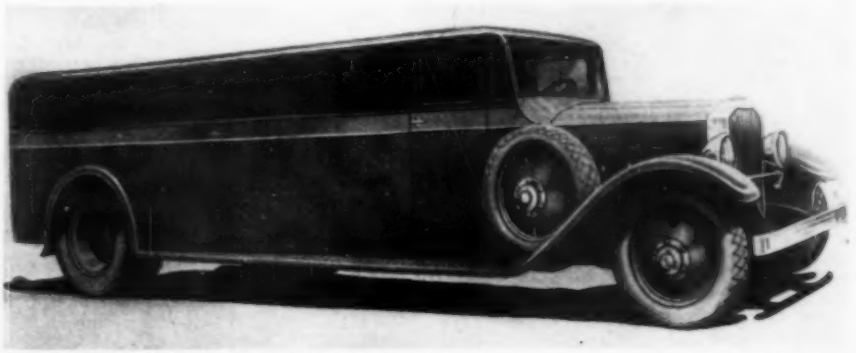
The eight-cylinder Pierce-Arrow engine produces 125 horsepower at 2800 r.p.m., and a torque of better than 270 foot pounds in the entire range from 1,000 to 1,900 r.p.m. It is rubber-mounted.

With effortless ease, this new Pierce-Arrow under full load can be accelerated within a comparatively few seconds from four to fifty-five miles per hour in direct drive, the makers claim, equalling passenger car standards of flexibility and acceleration.

The engine of 385 cubic inch displacement is an eight cylinder 3½ x 5—nine bearing "L" head type unit, equipped with vibration dampener, and in keeping with the modern trend for quietness of operation, the carburetor is equipped with a combination silencer and air cleaner as a built-in feature. The six blade cooling fan is driven by means of two V-type belts, and the cooling system is thermostatically controlled with the indicator on the instrument panel.

The transmission includes four forward speeds and one reverse. The heat treated frame, of sturdy design, has a maximum depth of 7⅝ in. with 4 in. flanges and 3/16 in. thickness. Springs are of the semi-elliptical type—38 x 2½ in. in front and 56 x 3 in. in the rear, with helper springs as standard equipment.

The rear axle, of the spiral-bevel, full-floating type, is of more than ample torque and load carrying capacity, and radius rods are an added standard feature.



Standard tire equipment includes 8.25 x 20 balloon tires with dual rears. Brakes are of the four wheel Duo-Servo type with moulded linings and a vacuum booster as standard equipment. Wheelbases range from 160 in. to 220 in.

Heavy-Duty Stromberg Carburetor

A NEW type heavy-duty carburetor has just gone into production in the South Bend plant of the Bendix Stromberg Carburetor Company, a Bendix Aviation Corporation subsidiary. It is adaptable to trucks, buses, tractors and industrial engines, regardless of size or number of cylinders.

Known as the "SF" type, the carburetor is made in five sizes, all models being of single barrel construction with diameters of 1, 1¼, 1½, 1¾ and 2 inches. The largest model is 8 x 7½ x 4½ inches over all, while the smallest is 5¾ x 6½ x 2½.

The carburetor is built on the familiar Stromberg plain tube principle and incorporates the exclusive double venturi construction which it is claimed adds extra power.

The float chamber is on the side which enables correct fuel level to be maintained on steep hills and sharpest turns. The float is of the hinge type with positive shut-off needle valve and gas inlet is from above.

All air bleeds and float chamber vent are taken through the air horn, thereby preventing dirt entering the carburetor.

INTERNATIONAL'S NEW 5-TONNERS

TWO new six-cylinder motor trucks, each with a rated capacity of 5 tons, have just been announced by International Harvester Company, Chicago, Ill. These are the Model A-7 and Model A-8 and are available in wheelbases of 160, 180, 200, and 225 inches, thus adapting them to a wide variety of heavy hauling, especially that encountered in tractor-trailer service and dump work.

Engines are of the six-cylinder valve-in-head type. Bore and stroke of the A-7 are respectively 4½ by 5½ inches and of the A-8 5 inches by 5½ inches. The A-7 develops 107 brake horsepower and the A-8 132 brake horsepower at governed speeds of 1,800 r.p.m. for each unit. Removable cylinders, a feature that contributes greatly to low-cost maintenance, are employed. Down-draft carburetion, fuel pump, oil-type air cleaner and thermostatically controlled cooling are other features of these power plants.

The clutch is of the single-plate type, and the transmission has five speeds forward and two reverse. A power take-off opening is on each side of the transmission case. Frames are pressed steel channels ⅜ inch thick and 12⅛ inches deep at the center and tapering to the front and rear.

Instead of the usual two springs, there are four springs at the rear end; these are semi-elliptic springs, one being mounted above and the other below the rear axle on each side as shown in the accompanying illustration. Both upper and lower springs are attached at the front to a swivel-beam equalizer, which equalizes torque and driving stresses from the upper and lower springs when power is applied.

This rear-spring construction promises greater ability to absorb the enormous torque and driving stresses of the rear axle, provides improved cushioning for chassis and load, and makes possible the use of dual tires as large as 11.25-24 or 44 x 10 heavy-duty type and an overall width on the road within 96 inches.

The rear axles are of the full-floating, double-reduction type with spiral-bevel gears in the first reduction and herring-bone gears for the second reduction. Both new models are equipped with four-wheel service brakes. The front-wheel brakes are of the internal-expanding, self-energizing, shoe type with a vacuum-operated booster. The rear-wheel brakes are of the internal-expanding, wrap-band type.

When the standard International two-man cab shown in the illustration is used, it is built integral with the cowl, permitting the use of the improved three-point cab mounting which contributes greatly to cab life. With the exception of the door framing, the cab is entirely of steel.

MAKES CARBURETOR ADJUSTMENT EASY

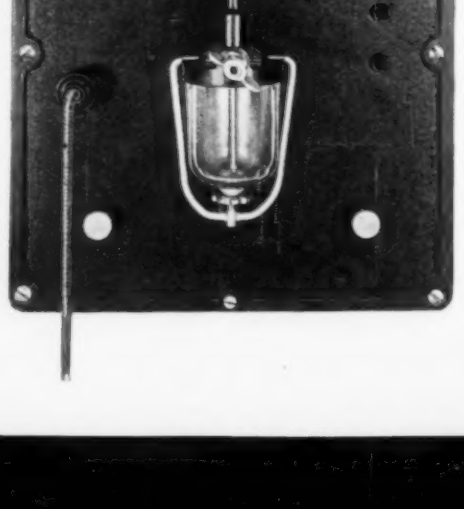
A DIRECT-READING meter, designed by Chas. Engelhard, Inc., Newark, N. J., is now available for quickly and accurately determining the most efficient air-fuel ratio setting of the carburetor by engine exhaust gas analysis.

The meter operates electrically and uses the Wheatstone Bridge principle of operation whereby the heat-conducting ability of the engine exhaust gas is compared with that of air. If the air-fuel ratio is low, the exhaust gas will have a high thermal conductivity and the meter will read correspondingly rich. If, on the other hand, the air-fuel ratio is normal, or high, the thermal conductivity of the exhaust gas will be low and the meter will indicate either normal or lean operation.

The meter scale is graduated in lbs. of air per lb. of gasoline burned and is divided into three sections: "lean, normal and rich." Each section is blocked off in a separate, distinct color which facilitates easy reading.

To apply the meter it is merely necessary to first balance the meter circuit and then connect the sampling tube to the exhaust pipe of the engine, permitting the static pressure of the gas to force a sample into the meter. As soon as this sample reaches the electrical measuring cell, the indicator pointer swings into position and indicates directly how rich or how lean the mixture actually is.

The meter is portable and entirely self-contained; the only external connection necessary is made between the meter and the engine exhaust pipe. It is simple to operate and the readings are easily interpreted. The consensus of opinion is that this instrument will prove of invaluable assistance to fleet owners who are seriously interested in gasoline economy and better engine performance.

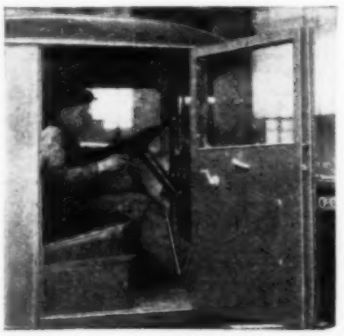


An interesting piece of literature has been prepared that thoroughly illustrates and describes this piece of equipment. Free copies are being distributed to readers of FLEET OWNER. If interested, drop a line directly to Chas. Engelhard, Inc., Chestnut St. & R. R. Ave., Newark, N. J. The Editor will place your inquiry into the proper hands, if you prefer. You'll mention FLEET OWNER, won't you?

Timken Axle to Exhibit

THE Timken-Detroit Axle Company, of Detroit, has signed for exhibit space in the Travel & Transport Building of A Century of Progress Exposition, to be held in Chicago during 1933, it is announced by P. W. Hood, vice president.

As this company has long been recognized as a pioneer and leader in the field of transportation, as inventor, designer and manufacturer of front and rear axles for automobiles, motor trucks, buses, electric railway cars and trackless trolleys, its exhibit should be both intensely interesting and highly educational.



for ROAD *and* SHOP

Auburn Spark Plugs

A LINE of heavy duty plugs, designated as "Series 1481" is announced by New York Mica & Mfg. Co., Auburn, New York, who has been manufacturing spark plugs for many years.

These plugs are especially recommended by the maker for use under the most extreme conditions — where other plugs are burning up electrodes, and blistering or breaking insulators.

Bus Companies, Public Utility Companies, Oil Companies, Packing Houses, Railroads, Trucking Companies, etc., are but a few of the types of business fleets that are using these plugs, the makers point out, and will be glad to send a list of users on request.

The maker also guarantees to replace, free of charge, any part found defective, without reserve—you to be the judge. This sounds like a liberal guarantee and readers are invited to write for samples, literature and prices. Address New York Mica & Mfg. Co., Auburn, N. Y., or the Editor of this publication, if you prefer.

Valve Spring Tension Equalizer

IN order to overcome the deficiencies of the ordinary form of valve spring retainer, the Boyle Valve Company, 5820 So. Ada St., Chicago, Ill., makers of the popular flat seating valve for replacement use in all types of motors, have perfected a new device known as the "Valve Spring Tension Equalizer." This new device is adaptable to all valve installations whether taper seat valves or flat seat valves.

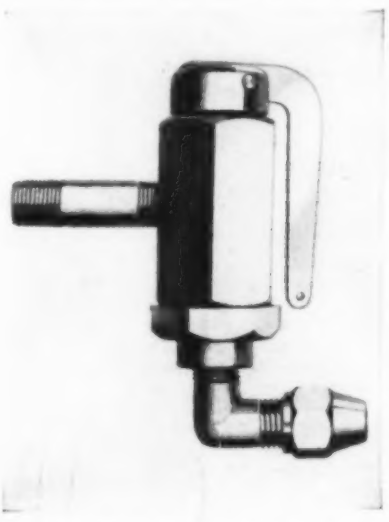
The device is so designed as to concentrate the spring tension on a valve retainer washer having at its center a conical formed depression which rests over any one of the generally used forms of valve retainers.

This construction allows of automatic equalization and centralization of the downward pressure of the spring so that the valve stem is held central in the guide and the valve seat face is thus held in even contact with the valve seat so that wear is always even and burning is prevented.

The device works equally well with either old or new valves, but when used in connection with the Boyle Flat Seat Super Valve is claimed to give an installation of especial appeal to fleet owners and others affiliated with the operation of heavy duty motors. Why not write for free literature on valves and equalizer? No obligation of course, and the Editor'll be glad to get it, if you prefer.

Primer Makes Easy Starting

THE P-O-L Primer, a unique device for facilitating the starting of gasoline engines, has just been introduced by The Linde Air Products Company, 30 East 42nd Street, New York, N. Y. The



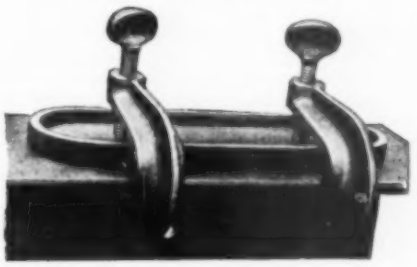
primer is an easily installed device for introducing acetylene, a highly combustible gas, into the cylinders of an internal combustion engine so that it will start easily and quickly. It provides a positive, safe, and economical method of starting.

The primer consists, essentially, of a special stem type brass primer valve, a Prest-O-Lite pressure regulator and 10 feet of ¼-inch brass tubing with compression unions. The assembly is used in conjunction with the ordinary Prest-O-Lite tanks that are used for headlighting systems on trucks and tractors.

The primer valve is mounted on the intake manifold of the engine, the regulator attached to the tank valve and the two connected with ¼-inch brass tubing. The regulator automatically reduces the tank pressure of the acetylene to a low line pressure and the primer valve controls its flow into the manifold. The valve is operated by a pull wire which leads from the valve lever through the dash if the vehicle has a self-starter, or through the radiator if hand cranking is employed.

If the truck or tractor is already equipped with a Prest-O-Lite tank, both primer and lighting system may be operated simultaneously from the same tank by the use of a simple adaptor. Write to the maker, or the Editor, for full details and prices.

Prol Vulcanizer for Tubes



THIS vulcanizer uses the familiar cup and clamp and burns a natural, aluminum fuel that is not affected by temperature, humidity or other conditions, according to Producers, Ltd., 5503 Edmunds St., Chicago, Ill.

With this vulcanizer, which uses pure gum rubber for the patch, the actual burning process is a slow, smouldering glow, rather than a flame or jet.

Fleet owners, particularly, will be interested in this device, since the makers claim that it will make patches for as low as one cent per patch. They also point out that it is used by such concerns as the Standard Oil Co. of Indiana, Roxana Petroleum Co., Armour & Co., Schulz Baking Company, Bakeries Service Corporation and many other fleets.

Complete information as to the Prol method and prices can be obtained from the Editor, or from Producers, Ltd., 5503 Edmunds St., Chicago, Ill. You'll mention this publication when writing, won't you?

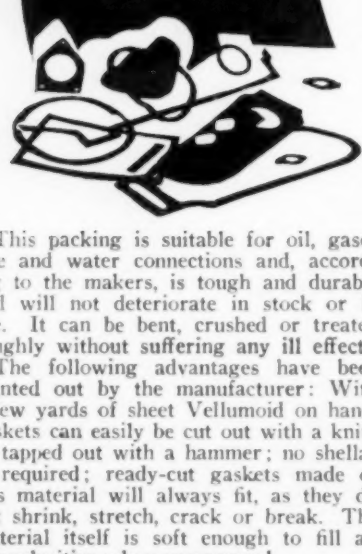
Carburetor Gasket Board

THE Vellumoid Company, Worcester, Mass., announces an attractive display board which will be of great convenience to fleet buyers, service stations and dealers, in the selection of the carburetor and outlet gaskets so frequently in demand. The gaskets are mounted on the board in their original cartons, so that they can be identified readily, and kept in orderly, useable condition.

NEW STUFF *for* ROAD *and* SHOP *(Continued)*

Free Gasket Sample—Got Yours?

AN interesting offer is being made to the readers of this publication for a limited time, by the Vellumoid Company, 54 Rockdale St., Worcester, Mass., in which they offer free of charge a generous-sized working sample, large enough to test out under actual working conditions, of Vellumoid sheet packing.

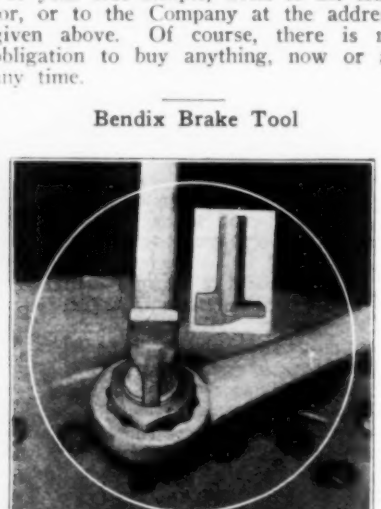


This packing is suitable for oil, gasoline and water connections and, according to the makers, is tough and durable and will not deteriorate in stock or in use. It can be bent, crushed or treated roughly without suffering any ill effects.

The following advantages have been pointed out by the manufacturer: With a few yards of sheet Vellumoid on hand, gaskets can easily be cut out with a knife or tapped out with a hammer; no shellac is required; ready-cut gaskets made of this material will always fit, as they do not shrink, stretch, crack or break. The material itself is soft enough to fill all irregularities when compressed.

Of course, the best way to know any product is to *use* it, and for this reason we have been able to obtain this offer of free samples for the mutual benefit of our readers and also the manufacturer. For your free sample, write to the Editor, or to the Company at the address given above. Of course, there is no obligation to buy anything, now or at any time.

Bendix Brake Tool



INCORPORATED in the new 16-inch Bendix single-anchor, duo-servo brake is an eccentric type anchor pin, which permits easy adjustment of brake shoes to compensate for lining wear.

To make this phase of servicing still easier for shop mechanics, the Bendix Brake Company, South Bend, Ind., has provided a special tool which is shown in the accompanying illustration. Its part number is 25397 and may be obtained through the service department of the company.

To Prevent Rust in Jackets

CHEMISTS and automotive engineers have been working on the problem of rust in cooling systems for many years and as a result, the National Carbon Company, Inc., makers of Eveready Prestone, now announce a product which will prevent the rusting of automobile systems —Eveready Rustone.

Most automotive service men realize that rust forms in cooling systems, but many of them are just beginning to appreciate the trouble it can cause. Corrosion and rusting begin when water is first put into the cooling system and from then on makes a continuous attack on all exposed iron and steel parts. If neglected, this results in overheating and possibly serious damage.

Heat increases corrosion and the formation of rust. Therefore, during warm weather driving, rust accumulates more rapidly, thus interfering with proper cooling of the engine at the time when it is needed most.

Eveready Rustone is a special compound which, when added to the automobile cooling system stops the formation of rust and protects the system from the corrosive action of water.

Eveready Rustone is simple and easy to service. It is only necessary to drain and flush the automobile cooling system, then fill it with clean water. With the engine running, pour the contents of a can of Eveready Rustone into the radiator. Eveready Rustone does not evaporate and one supply, used as directed, will last during the entire warm weather driving season.

Chrome-Plated Piston Pins

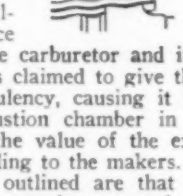
A CHROME-PLATED piston pin which is said to outwear a hardened steel pin and claimed to be corrosion resistant, has been developed and offered for both equipment and replacement use by Thompson Products, Inc., Cleveland, Ohio.

The virtue of chrome-plate lies in its extreme hardness, only the diamond and sapphire being harder. Because of this, it has tremendous resistance to wear, one of the most recent applications being the chrome-plating of high power rifle barrels for greater accuracy and longer life.

For several years engineers have realized the possible advantages of chrome-plated pins, but difficulties encountered in plating, including uniformity of coating and preventing the ends from building up, have retarded progress.

The chrome-plated pin has a lower coefficient of friction than the hardened steel pin, and the danger of seizure between pin and piston boss is minimized. The pin, it is said, never requires replacement during the life of the automobile. Scrapping of pins in storage because of rust or fingerprints is eliminated as the pin is non-corrosive. Write Thompson Products, Cleveland, Ohio, for free catalog.

"Whirlgas" Carburetor Mixer



A NEW patented carburetor mixer that is said to work in conjunction with all standard carburetors, has recently been placed on the market by Whirlgas, 7237 Jefferson Ave. E., Detroit, Mich.

As shown in the illustration, this device is placed between the carburetor and intake manifold, and is claimed to give the fuel a cyclonic turbulency, causing it to arrive at the combustion chamber in a fog and increasing the value of the explosive action, according to the makers.

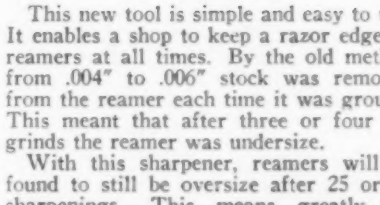
Other advantages outlined are that it will enable the engine to be operated at a much leaner mixture, thus increasing gasoline mileage. It is also said to permit the use of low-test gasoline with satisfactory results, including the absence of fuel-knock; to prevent backfire flames; to minimize the formation of carbon; to give better acceleration and smoother motor performance.

The manufacturers, or the Editor, will be glad to send full details and prices on request.

Universal Reamer Sharpener

EVERY shop using reamers will welcome the news that the De Luxe Products Corporation has placed on the market a new universal reamer sharpener.

The De Luxe reamer sharpener eliminates the grinding of reamers; produces a finer cutting edge in five minutes or less; and greatly increases the life of the reamer itself. It is fully universal—for it will sharpen any straight fluted or spiral reamer from 5/16" to 1 7/8" in diameter and any reamer up to 18" in length.



This new tool is simple and easy to use. It enables a shop to keep a razor edge on reamers at all times. By the old method from .004" to .006" stock was removed from the reamer each time it was ground. This meant that after three or four regrinds the reamer was undersize.

With this sharpener, reamers will be found to still be oversize after 25 or 30 sharpenings. This means greatly increased life of the reamer in addition to saving the user the cost of grinding.

The manufacturer will gladly send any shop a descriptive folder on this new tool. The Editor will get this for you, if you prefer, or address De Luxe Products Corp., LaPorte, Ind.

NEW STUFF *for* ROAD *and* SHOP (*Continued*)

Oil Resistant Cable

AN ignition cable specially developed to resist oil and wear due to excessive vibration has been announced by the Belden Manufacturing Company, 4685 West Van Buren Street, Chicago, Illinois.

Tinned copper wire (19x27) is imbedded in a specially developed orange rubber insulating core. A cotton braid is applied which is impregnated with Beldenlac Aircraft standard lacquer. At this point the cable is the same as the regular Beldenlac Aircraft Standard Ignition Cable. Over this is wound varnished cambric tape. A cotton braid over the tape is coated with Beldenlac Aircraft standard lacquer. Thus the new cable has three strong protective layers besides the usual insulating core, braid and lacquer.

No. 7781 is recommended for "oil splashers," trucks, and buses that see continuous service, and airplanes.

A free sample of this new cable is offered. Write directly to Belden Mfg. Co., 4685 W. Van Buren St., Chicago, Ill.

New Brake Drum Booklet

WHAT is claimed to be the most important development in brakes since the introduction of the 4-wheel system, is illustrated and described in a booklet entitled "Centrifuse Brake Drums" recently issued by The Motor Wheel Corporation, Lansing, Mich.

The booklet outlines the construction of this new type of brake drum, claimed to be of revolutionary construction; heat-dissipating; self-truing; noiseless and combining the strength and lightness of steel with the advantages of the cast-iron braking surface.

Fleet maintenance men will find this book of considerable interest and are invited to write, for free copies, to Motor Wheel Corporation, Lansing, Mich. The Editor will get you a copy, if you prefer.

Overload Coil Spring

A NEW helper spring of the coil type is announced by Stratton Overload Coil Spring Co., Antigo, Wis. It is illustrated herewith.

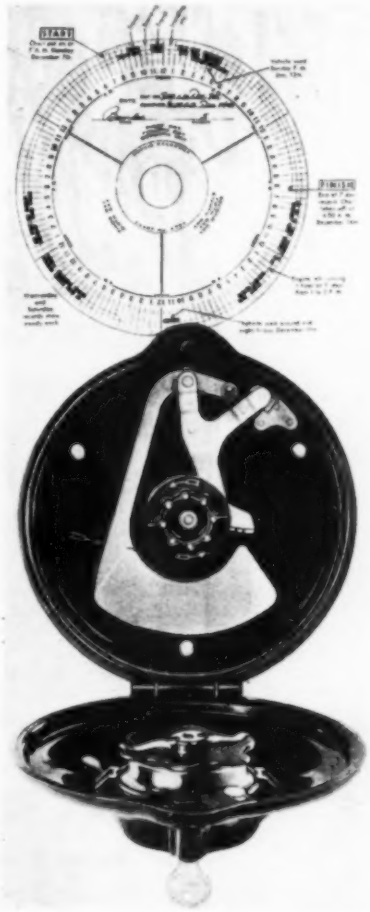
The makers claim that this spring will also stop side-sway and eliminate rolling-off of tires on bad turns; that it will stop flighty steering on up-grades, especially with shifting loads; and that it will eliminate twisting.

It can be installed in 30 minutes without special tools, the Company states and the fact that it adds a husky cross member to the frame is also pointed out. Write for complete details, installation data and prices. The Editor will get same for you, if you prefer.

New Model "Servis Recorder"

THE Service Recorder Company of Cleveland, Ohio, have just brought out a new model which is different from any they have heretofore offered. This new recorder makes a 3-day or 7-day record of truck operation on one big 6" chart. The picture herewith shows such a chart and also the mechanism which makes possible this kind of record.

It's accomplished by "winding up the marking device" (elevating it) as well as winding the clock mechanism. Then when the clock unwinds, it also "unwinds the marking mechanism" (causing it to descend).



All of this is done by means of the coupling knob with the eight spring posts and the two arrows. To wind up the marking device (which is a sapphire stylus on the right end of the pendulum arm) you turn the little coupling knob to the left (in the direction of the arrows). This elevates the entire pendulum, and with it the stylus or marker, so that the stylus is all ready to begin its spiral record on the outer rim of the chart. When the recorder case is closed, this coupling knob engages with the clock movement and turns very slowly with it; that is, it gradually unwinds and causes the pendulum and stylus to descend gradually and uniformly in the course of three complete revolutions of the clock movement. This makes possible a spiral record, "three abreast", so to speak.

This new recorder will make life a lot easier for the man who used to have to change the charts every 24 hours. In the old model it would spoil the previous day's record to leave the chart on longer than 24 hours.

A new booklet entitled "Ten Ways of Getting More Work Out of Trucks" has just been issued and is offered to our readers, free. Write to The Service Recorder Co., Hanna Bldg., Cleveland, Ohio, for complimentary copy.

Goodrich Hi-Speed Fan Belt

RECOGNIZING the ever-growing tendency toward higher engine speeds in the automobile industry, which leaders of the field have been stressing for several years, The B. F. Goodrich Company, Akron has just developed a new high speed fan belt which has passed every rigid test up to 5000 R.P.M.

To produce this belt which is revolutionary when compared to former slower speed belts, it was necessary to design a new dynamometer set and an entire new line of machines, according to J. H. Connors, Goodrich vice-president, who made the announcement. Write for details and prices; mention this publication, please.

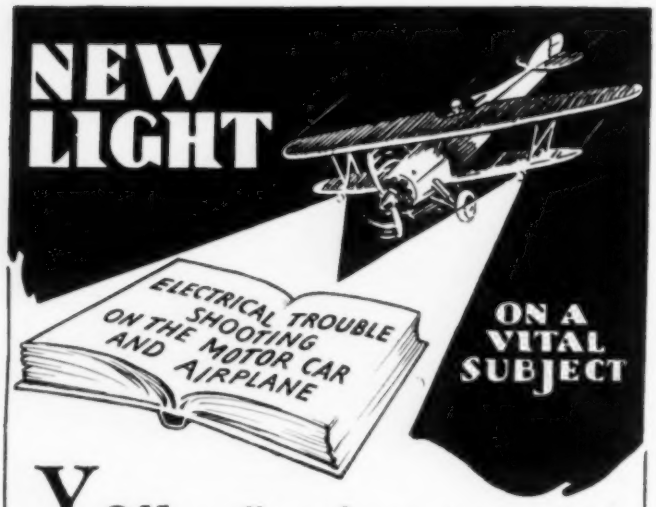
Heavy-Duty Ignition Coil

A NEW heavy duty coil, designed by Delco-Remy ignition engineers to meet the severe requirements of motor coach, truck and marine service, has been announced by the Delco-Remy Corporation, Anderson, Ind.

An entirely new development in ignition coils, it is distinguished by its finwall case, the extra area of which insures adequate cooling. Additional features are its rugged design, its moisture-proof construction, a cap made of a new high-dielectric and arc-resisting material and the screw type high-tension terminal.

Every detail has been designed to provide a rugged, dependable ignition coil for this type of service with ample reserve capacity for heaviest operating conditions, according to the makers. Both 6 volt and 12 volt models are available.

United Motors service branches and authorized electrical service stations are distributors. For full information write to Delco-Remy Corporation, Anderson, Ind., mentioning this publication, please.



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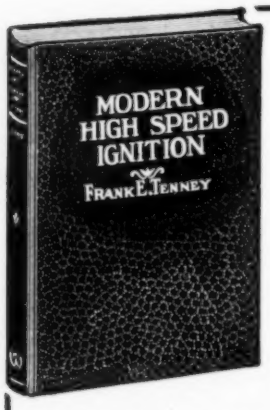

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